Northern Region Bat Species Occurrences in Idaho

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Abstract

The purpose of this report is to summarize available distributional records and habitat information for bats occurring in US Forest Service Northern Region National Forests (NF) in Idaho and Ranger Districts (RD) within these forests. We compiled observations derived from various sources, including survey data, museum specimens, literature, and incidental sightings. The known ranges of 11 species overlap the Idaho portion of the Northern Region, and these are represented by records in our dataset. Up to five other species may be present in these National Forests, including three species that have been tentatively identified from echolocation sonograms and two species that have been documented to occur adjacent to these National Forests. Eleven species are represented by in-hand identifications or specimens in the Idaho Panhandle and Nez Perce National Forests, but only 10 species have been confirmed in the Clearwater National Forest, and just one species was confirmed in the Idaho portion of the Bitterroot NF. Among the species confirmed to occur in the National Forests, the silver-haired bat (*Lasionycteris noctivagans*) was the most commonly detected species based on relative number of records, followed by California myotis (*Myotis californicus*), long-eared myotis (*Myotis evotis*), little brown myotis (*Myotis lucifugus*), long-legged myotis (*Myotis volans*), and Yuma myotis (*Myotis yumanensis*); western small-footed myotis (*Myotis ciliolabrum*) and Townsend's big-eared bat (*Corynorhinus townsendii*) were detected least often. We review the habitat, ecology, and distribution for each species.

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Introduction

The purpose of this report is to summarize available distributional records of bats occurring in the Idaho portion of the US Forest Service (USFS) Northern Region. This effort was motivated by the availability of new data generated through surveys conducted by USFS and recognition that published information regarding bat distribution in northern Idaho is largely outdated. Recent developments relevant to bat management and conservation include emergence of a fungal pathogen that causes a fatal condition in hibernating bats, white-nosed syndrome, that has devastated bat populations in portions of eastern North America (Blehert et al. 2009). The recent spread of this pathogen in eastern North America has lead to petitions for Endangered Species Act listing of species formerly considered to be widespread, abundant, and secure, including the little brown myotis (*Myotis lucifugus*). Although this pathogen has not been documented to occur in Idaho or any portions of the western USA, the limits to its distribution are currently unknown, and current efforts are focused on slowing spread to new areas.

Idaho's bat fauna was first addressed in "The Recent Mammals of Idaho" (Davis 1939), which included a synthesis of distribution, identification, and ecology of the 11 species known from the state at that time. Since then, records of the spotted bat (*Euderma maculatum*) (Tucker 1957), pallid bat (*Antrozous pallidus*) (Fichter 1964), and fringed myotis (*Myotis thysanodes*) (Jones and Webb 1953) expanded the state list to the 14 species now known to occur in Idaho (Larrison 1967, Keller 1985). Of these, 11 are broadly distributed within the state and have previously been documented to occur in the Idaho portion of the USFS Northern Region.

Some bats are currently regarded as high-priority conservation targets in Idaho. Four species—the California myotis (*Myotis californicus*), fringed myotis, Townsend's big eared bat (*Corynorhinus townsendii*), and spotted bat—are designated Species of Greatest Conservation Need in Idaho's Comprehensive Wildlife Conservation Strategy (IDFG 2005) (Table 1). Six species are listed as Sensitive in the Northern Region: the long-eared myotis (*Myotis evotis*), fringed myotis, long-legged myotis (*Myotis volans*), Townsend's big-eared bat, pallid bat, and spotted bat. The 2004 USFS Northern Region sensitive species list indicated just two of the Sensitive species were known to occur in Idaho National Forests (NF) within the region: the fringed myotis was known from the Clearwater, Idaho Panhandle, and Nez Perce NFs; the Townsend's big-eared bat was known from the Bitterroot and Idaho Panhandle NFs, and was suspected on the Clearwater and Nez Perce NFs (USFS 2004).

In this report, we summarize information from surveys conducted on Northern Region NFs during 2005-2008, as well as existing records for all species known to occur in Idaho and species potentially occurring in the state. We also provide a short summary of basic ecological characteristics for each species.

Study Area

The USFS Northern Region is bounded by the Salmon River along its southern boundary and extends north to the Canada border. This region includes four NFs in Idaho, comprising the Clearwater NF, Idaho Panhandle NF, Nez Perce NF, and a portion of the Bitterroot NF (Fig. 1). Each NF is subdivided into Ranger Districts (RD), and 17 RDs occur in Idaho and are included in this report.

The Northern Region includes large areas of designated wilderness in Idaho, including the Hell's Canyon, Selway-Bitterroot, Frank Church River-of-No-Return, and Gospel Hump wilderness areas.

Data Sources

USFS provided 1686 distribution records identified to species collected during 2005-2008. These records included bats identified in-hand after capture in mist-nets and species identified by sonograms of echolocation calls recorded with ultrasonic bat detectors (acoustic surveys). Some individuals were identified from genetic samples. We added these records to a database developed and managed by the Idaho Department of Fish and Game Natural Heritage Program (IDNHP). This database includes animal observations derived from survey data, museum specimens, literature, and incidental sightings and, prior to incorporation of the USFS dataset, included 549 records of bats on Northern Region RDs.

The taxonomic level to which identification was made and the level of support for identification varied within our dataset. Records based on specimens or molecular samples were considered to represent "conclusive" species-level identifications. Identifications to species based on specimens or in-hand identifications made by experienced biologists or trained field crews were considered to be "confirmed" records of distribution. Records submitted by the public—a data type common within the IDFG dataset—or those tentatively identified by professional biologists are regarded as questionable records that may or may not represent correct identification. Identification based solely on call sonograms generated from recordings of echolocation calls, such as those recorded with Anabat or Sonobat equipment, were considered to be records of

–potential" distribution. All categories could contain misidentifications, but we regard the likelihood of misidentification to be highest for acoustic samples.

Reliability of identification also varies by species. Some bats are easily identifiable by morphological characters, and others produce unique and characteristic echolocation calls. However, some species are difficult to distinguish, even by experts, on the basis of morphology and echolocation calls, so misidentified bats could occur within the dataset. Some calls or visual identifications were assigned to species groups, genus, or family, and we considered these to represent –potential" distribution. Unidentified bats were sometimes reported from mine exit surveys, unidentified acoustic data, or in cases where a bat escaped from a net before identification. When no identification was attempted or possible, records were not included in data summaries. In some cases, confident identification was not possible, but the identification of the bat could be narrowed to two or three species. This was a somewhat common occurrence for echolocation calls. When identification was irresolvable between two or more species, we considered these species to be of –potential" occurrence.

Results

Bat diversity

Eleven species are represented on Northern Region NFs by conclusive or confirmed records (Table 2): big brown bat (*Eptesicus fuscus*), silver-haired bat (*Lasionycteris noctivagans*), hoary bat (*Lasiurus cinereus*), California myotis (*Myotis californicus*), western small-footed myotis (*Myotis ciliolabrum*), long-eared myotis (*Myotis evotis*), little brown myotis (*Myotis lucifugus*), fringed myotis (*Myotis thysanodes*), long-legged myotis (*Myotis volans*), Yuma myotis (*Myotis yumanensis*), and Townsend's big-eared bat (*Corynorhinus townsendii*). An additional three species may occur in NFs, represented in the dataset only by records of potential occurrence. The canyon bat (*Parastrellus hesperus*), western red bat (*Lasiurus blossevillii*), and Brazilian free-tailed bat (*Tadarida brasiliensis*) were tentatively identified on the basis of echolocation calls. Neither the red bat nor the Brazilian free-tailed bat has been documented to occur in Idaho. Another two species known to occur in Idaho—the spotted bat (*Euderma maculatum*) and pallid bat (*Antrozous pallidus*)—have not been documented to occur in Northern Region National Forests but have been detected on adjacent lands. All species are treated in more detail below in the section –Species Accounts." Morphometric data collected from bats captured during 2005-2008 surveys are summarized in the Appendix.

Species lists for each NF include 13 species in the Idaho Panhandle NF (11 species confirmed/conclusive and 2 potential), 14 species in the Nez Perce NF (11 species confirmed/conclusive and 3 potential), and 10 species in the Clearwater NF (all species confirmed/conclusive) (Table 3). Just one species has been confirmed in the Idaho portion of the Bitterroot NF. Not all species have been reported in all RDs (Table 4), and an understanding of species diversity appears to be limited by low survey effort in most RDs. No surveys were conducted 2005-2008 in the West Fork RD (Bitterroot NF), and only one IDFG database record was in this RD. No surveys were conducted 2005-2008 in the Idaho portions of the Cabinet and Three Rivers RDs (Idaho Panhandle NF), and no IDFG database records were in these districts. Survey data were also limited for the Powell RD (Clearwater NF) and Wallowa Mountains RD (Nez Perce NF), and the fewest number of species were documented in these districts—just two species from the Powell RD and three species from the Wallowa Mountains RD (Table 4).

Species Distribution

The distribution of bat records is affected by both the pattern of sampling and the actual distribution and relative abundance. The frequency of individual species within the dataset is also a combination of sampling and biological effects. The frequency of encountering a given species may be related to abundance or it may be related to the probability of detection by a particular method and intensity of survey. Without directly accounting for probability of detection, the sampling and biological characteristics are confounded within our dataset. Nevertheless, differences in the overall number of records for each species (Fig. 2) and the number of RDs where a species has been detected (Table 4) are evident. Several species were detected in a high proportion of RDs and were represented by substantial numbers of records. The silver-haired bat was the most widespread species (confirmed in 12 of the 17 RDs and having a potential record in a 13th RD; Table 4) and was the most commonly detected species, recorded twice as often as any other (Fig. 2). The long-eared myotis, little brown myotis, California myotis, and Yuma myotis were the next most commonly detected species (Fig. 2), and each was confirmed in 10 or 11 RDs and potential in up to two additional RDs (Table 4). In contrast, the long-legged myotis and Townsend‘s big-eared bat were each detected at a relatively low rate, but records were distributed among a high proportion of RDs (11 RDs and nine RDs, respectively). Townsend‘s big-eared bat and the western small-footed myotis, both cavern-roosting species, were the least commonly detected (Fig. 2), with 57 and 36 records respectively.

Species Accounts

Below, we summarize information regarding distribution, roost characteristics, and habitat for all species of bats known to occur in Idaho, as well as two species reported from the state on the basis of echolocation calls. In general, few intensive studies of Idaho bats have been published in peer-reviewed journals. Therefore, we have drawn much of the information from general technical works, reports developed for resource management agencies, and status assessments. We have not provided exhaustive literature reviews. Instead, we have focused on developing a profile of habitat associations and, when possible, identifying key information sources.

Big brown bat

This bat ranges from southern Canada through the continental United States into South America (e.g., Harvey et al. 1999). The species has been reported from eight RDs: the Lochsa, North Fork, and Palouse RDs (Clearwater NF), the Coeur d'Alene River and Sandpoint RDs (Idaho Panhandle NF), and the Clearwater, Moose Creek and Salmon River RDs (Nez Perce NF)(Fig. 3).

The big brown bat uses a variety of anthropogenic roost sites, including protected locations in buildings or under bridges (Harvey et al. 1999) or in natural roosts, such as rock crevices and tree cavities (Nagorsen and Brigham 1993). During summer, roosts in live and dead trees are used, including roosts in cavities of quaking aspen (*Populus tremuloides*) and ponderosa pine (*Pinus ponderosa*) (Barclay and Kurta 2007). Colonies averaging 100 individuals have been reported in tree cavities in the Okanagan Valley of British Columbia (Nagorsen and Brigham 1993). Fidelity to roost sites and foraging areas has been observed (Harvey et al. 1999). In one study, individuals roosted up to 4 km from foraging sites, bypassing apparently suitable roost sites (Nagorsen and Brigham 1993).

Big brown bats forage over water, above forest canopies, along roads, and around street lights (Nagorsen and Brigham 1993). Relatively robust teeth and jaws may be an adaption for preying on beetles having well-developed exoskeletons (Coutts et al. 1973, Nagorsen and Brigham 1993). Mayflies, stoneflies, ants, flies, mosquitoes, and other insects are also consumed (Agosta 2002).

During winter, resident populations may hibernate or populations may migrate to other areas, but winter habitat use or movements are unknown in northern Idaho. Individuals have been captured or observed in Idaho's Northern Region NFs

beginning in late June. The frequency of observations peaks in July and August and taper off during September. Rust (1946) designated 4 November as the "latest fall record" in the vicinity of Coeur d'Alene. All winter records for Idaho are from the southern part of the state. Across the species' range, individuals and small groups have been found overwintering in caves, mines, and occasionally buildings (Kurta and Baker 1990). In caves and mines, individuals may hibernate under rocks, wedged into crevices, or in exposed areas. In a British Columbia hibernaculum, big brown bats usually selected dry microclimates in exposed locations near the entrance where temperature was -10 to -5° C (14 to 23° F) (Nagorsen and Brigham 1993). Movements of up to 300 km (185 miles) to wintering sites have been reported, but most have been no more than 80 km (50 miles) (Nagorsen and Brigham 1993).

Silver-haired bat

The silver-haired bat occurs throughout most of the United States and Canada, and parts of northeastern Mexico (Harvey et al. 1999, Patterson et al. 2007). The species is thought to be most abundant in the Northern Rockies in Wyoming, Montana, and Idaho (Adams 2003). In our dataset, silver-haired bat records were distributed among 13 RDs: the Lochsa, North Fork, Palouse, and Powell RDs (Clearwater NF), the Bonners Ferry, Coeur d'Alene River, Priest Lake, Sandpoint, and St. Joe RDs (Idaho Panhandle NF), and the Clearwater, Moose Creek, Red River, and Salmon River RDs (Nez Perce NF)(Fig. 4).

Although the silver-haired bat is occasionally found in sheds, garages, and other outbuildings, individuals typically roost singly or in small groups beneath bark or in cavities (Harvey et al. 1999; Adams 2003, Nagorsen and Brigham 1993). Small maternity colonies have been found in cavities excavated by woodpecker (Nagorsen and Brigham 1993, Parsons et al. 1986). The species uses a variety of tree species, including ponderosa pine, lodgepole pine, quaking aspen, balsam popular *(Populus balsamifera*), and western white pine (*Pinus monticola*) (Barclay and Kurta 2007). Individuals have been found roosting more often than expected in western white pine, lodgepole pine, and quaking aspen, and less often in Douglas-fir (Barclay and Kurta 2007, Vonhof and Barclay 1996). The silver-haired bat may be most abundant in old-growth forest stands, which provide plentiful roosting sites in snags and old trees (Nagorsen and Brigham 1993).

Individuals typically forage at tree-top level and over small ponds and streams, generally until midnight and again an hour before dawn (Nagorsen and Brigham 1993). The species is considered a moth specialist, but will capture a wide

variety of small insects, including leafhoppers, flies, midges, flying ants, mosquitoes, termites, and beetles (Adams 2003, Nagorsen and Brigham 1993). High-frequency echolocation and slow, maneuverable flight enable the species to take advantage of swarms of small insects (Nagorsen and Brigham 1993).

Based on seasonal abundance of individuals and spatial data from museum records, most individuals are thought to be migratory (Cryan 2003), and the range shifts generally northward in spring and southward in winter. In some regions of North America, sexes may segregate such that males and females occupy separate summer ranges (Cryan 2003). In the western United States, most individuals are thought to hibernate in the southwest and Pacific Northwest (Cryan 2003, Izor 1979). During the spring and autumn migration period, roosts may be in atypical woody habitat, including piles of lumber, stacks of railroad ties, and on fence posts (Harvey et al. 1999, Nagorsen and Brigham 1993). The species hibernates in protected shelters such as tree cavities, rock crevices, mines, and occasionally buildings (Kunz 1982). In old mines, individuals hibernate where temperatures are -2 to -0.5° C (28 to 31° F) (Nagorsen and Brigham 1993).

In interior British Columbia at least a portion of the population may not be migratory (Kunz 1982, Nagorsen and Brigham 1993). North of Idaho, winter records exist from the Okanagan Valley north to Williams Lake, BC, where trees appear to be the most important hibernation sites. There, the species has most often been found hibernating under the bark of western red cedars, and one individual was found in a Douglas-fir snag (Nagorsen et al. 1993). In Idaho, Keller (2000) reported a silver-haired bat on 9 January 1996 in an adit of the Clark Fork mine, on the southeastern edge of Lake Pend Oreille, 1.5 km (1 mile) south and 3.5 km (2 miles) north of the Sandpoint RD. A silver-haired bat, perhaps the same individual, was also present in the same adit on 13 March 1996. Keller (2000) stated that silver-haired bats rest in mines during migration, but do not typically hibernate in Idaho. The known northern limits of winter museum records suggest individuals can hibernate in regions with a January mean minimum isotherm of -7° C (20° F)(Nagorsen and Brigham 1993; Izor 1979). Based on U.S. Geological Survey data (1970, drawn by Izor 1979), this limit sweeps along southern Arizona and Nevada, along coastal California and Oregon, along the interface of Oregon and Washington and into the Palouse Prairie of Idaho.

Hoary bat

The hoary bat is among the most widely distributed bats, ranging from southern Canada across the continental United States to Mexico and most of South America (Harvey et al. 1999). Although records were relatively uncommon in our dataset, representing just 3% of all records, the species was widespread across the Northern Region in Idaho, reported from 10 RDs: the Lochsa, North Fork, and Palouse RDs (Clearwater NF), the Bonners Ferry, Coeur d'Alene River, and Sandpoint RDs (Idaho Panhandle NF), and the Clearwater, Moose Creek, Red River, and Salmon River RDs (Nez Perce NF) (Fig. 5).

The hoary bat is a solitary, foliage-roosting bat. Roost sites are concealed in foliage of conifer and deciduous tree canopies (Harvey et al. 1999, Adams 2003). Uncommonly, woodpecker cavities, squirrel nests, and debris piles serve as roost sites (Shump and Shump 1982). Individuals frequently switch roosts, but females and young remain at the same roost site until young are volant (Carter and Menzel 2007). Young are left alone in the canopy when females forage for approximately the first month, and females may reduce foraging time to tend non-volant young (Barclay 1989). The species is generally regarded as a moth specialist that forages at tree-top level in open areas above fields and clearings (Shump and Shump 1982, Nagorsen and Brigham 1993). Beetles, true bugs, ants, wasps, flies, and midges are also taken (Nagorsen and Brigham 1993, Valdez and Cryan 2009).

Although the hoary bat is capable of prolonged torpor and may occasionally undergo hibernation where cold temperature occurs within the winter range (Shump and Shump 1982), the species is believed to typically undertake long-range seasonal migrations between breeding areas at northern latitudes and southern wintering grounds, although the patterns and routes of migration remains poorly understood at both local and continental scales (Findley and Jones 1964, Cryan 2003, Cryan et al. 2004). Males and females segregate geographically during the warm months, and females are expected to be absent from Idaho until late summer and fall migrations (Findley and Jones 1964, Cryan 2003). Populations in the Pacific Northwest may migrate to California or Mexico for the winter (Nagorsen and Brigham 1993). Migrating hoary bats may be particularly susceptible to mortality at wind turbines, although the reasons for this pattern are unclear (e.g., Kunz et al. 2007).

California myotis

The California myotis ranges from southern Alaska to New Mexico, inhabiting arid regions, coastal rainforest, and montane forests (Simpson 1993, Harvey et

al. 1999, Nagorsen and Brigham 1993). Differentiating California myotis from the western small-footed myotis is difficult on the basis of morphology, and due caution is warranted when evaluating datasets where the distributions of these species overlap. In northern Idaho, the species was reported from 11 RDs: the Lochsa, North Fork, and Palouse RDs (Clearwater NF), the Bonners Ferry, Coeur d'Alene River, St. Joe, and Sandpoint RDs (Idaho Panhandle NF), and the Clearwater, Moose Creek, Red River, and Salmon River RDs (Nez Perce NF) (Fig. 6).

The California myotis roosts in crevices, tree cavities, under bark, and in buildings, caves, and mines (Harvey et al. 1999, Tuttle and Taylor 1994). Reproductive females in conifer forests near Kootenay Lake and in the Pend d'Oreille Valley, British Columbia, roosted in patches of ponderosa pine, and within the patches, used large ponderosa pine snags with loose bark (Brigham et al. 1997). Individuals also roosted in western white pine and grand fir, but Douglas-fir was selected less often than expected compared to availability (Brigham et al. 1997). Up to 52 individuals shared the roosts, and the tracked bats switched roosts almost daily (Brigham et al. 1997). The species uses caves and mines for hibernation (Harvey et al. 1999). Just one individual has been reported from the winter months in Idaho. This was a specimen taken in the North South ski area, near the border of the Palouse RD. Whether this bat was hibernating in a building or was found in the forest was not documented.

Individuals forage over water, at forest edges, and in open country. Foraging flights are typically low to the ground, often within a few meters of the ground (Simpson 1993). Prey comprises small insects, primarily flies, moths, and beetles (Harvey et al. 1999, Simpson 1993). Slow, maneuverable flight is typical and contributes to relatively short-range flights during foraging bouts (Adams 2003, Simpson 1993).

Western small-footed myotis

The western small-footed myotis ranges across western North America from the Great Plains west to the Cascade Range (Adams 2003, Harvey et al. 1999, Holloway and Barclay 2001), particularly in arid locations associated with cliffs, buttes, and steep riverbanks (Harvey et al. 1999). The species was the least frequently detected myotis in Northern Region NFs, but records were relatively widespread. Individuals were detected in seven RDs: the North Fork RD (Clearwater NF), the Bonners Ferry, Coeur d'Alene River, and Sandpoint RDs (Idaho Panhandle NF), and the Clearwater, Moose Creek, and Salmon River RDs (Fig. 7).

The species occasionally roosts in buildings or under loose bark on tree trunks, but individuals typically roost singly or in small groups of 2 to 6 in small cracks and crevices in rock, boulders, cliffs, earthen banks, and talus slopes (Garcia et al. 1995, Harvey et al. 1999, Nagorsen and Brigham 1993). Similar sites are used as maternity roosts (Garcia et al. 1995). Night roosts include small caves, mines, and buildings (Garcia et al. 1995, Nagorsen and Brigham 1993).

Hibernation sites are in caves and mines (Manning and Jones 1989, Harvey et al. 1999), most often on wall and ceiling surfaces, within cracks and cavities, or clinging to the underside of rocks or rock shelves alone or in small groups (Garcia et al. 1995). In Montana and southern Idaho, the species has been found hibernating in caves and mines within a temperature range of 1.5° to 5.5° C (35° to 42° F) (Garcia et al. 1995). The western small-footed myotis likely hibernates near summer habitat, but the overlap of the two ranges is not well-documented (Garcia et al. 1995). One winter record for western small-footed myotis occurs in northern Idaho. The individual was found in an exploratory adit on 9 January 1996 at the Clark Fork mine, on the southeastern edge of Lake Pend Oreille. Hibernacula often contain other species, particularly Townsend's big-eared bat in southern Idaho.

The western small-footed myotis forages along cliff edges, rocky slopes, and riparian habitat. Prey includes moths, wasps, beetles, flies, and caddisflies (Garcia et al. 1995).

Western long-eared myotis

The western long-eared myotis ranges across much of southwestern Canada, the western United States, and Baja California, Mexico (Harvey et al. 1999). The species was one of the most widely reported in the dataset, from 11 RDs: the North Fork and Palouse RDs (Clearwater NF), the Bonners Ferry, Coeur d'Alene River, Priest Lake, Sandpoint, and St. Joe RDs (Idaho Panhandle NF), and the Clearwater, Moose Creek, Red River, and Salmon River RDs (Nez Perce NF) (Fig. 8).

The western long-eared myotis often occurs in rocky areas within an extensive variety of habitats (Adams 2003). In western Canada it is one of the few bat species consistently found at high elevations (Nagorsen and Brigham 1993). Individuals typically roost under bark, in tree cavities, in crevices in cliffs, or in abandoned buildings (Harvey et al. 1999, Nagorsen and Brigham 1993). The species has been found roosting in the snags and stumps of Douglas-fir

(*Pseudotsuga menziesii*) and western hemlock (*Tsuga heterophylla*)(Barclay and Kurta 2007), as well as under loose bark on pine stumps (Vonhof and Barclay 1997).

In at least some areas, reproductive females roost almost exclusively in rock crevices in open, rocky habitats, even when tree roosts are available nearby. Rocky sites probably provide consistently warm environments for the higher energy demands of reproductive females and their young (Rancourt et al. 2005). In an eastern Washington forest, females chose 2-cm-wide fissures in small, isolated rocks or low-profile outcroppings of bedrock (Rancourt et al. 2005). In the South Saskatchewan River Valley, Alberta, females roosted almost exclusively in cracks in sandstone boulders (Chruszcz and Barclay 2002). In both cases, the females frequently switched roosts (Rancourt et al. 2005; Chruszcz and Barclay 2002).

Echolocation calls are adapted for gleaning insects in dense vegetation (Nagorsen and Brigham 1993). The species forages throughout the night, with relatively little time spent at night roosts (Chruszcz and Barclay 2003). Individuals fly along paths and in forest (Barclay 1991), and also glean insects from vegetation and on the ground (Nagorsen and Brigham 1993; Chruszcz and Barclay 2003). Gleaning provides a reliable source of prey and may enable females to successfully raise young at higher, cooler elevations and in other areas where flying insects are less abundant (Nagorsen and Brigham 1993, Barclay 1991).

The species is thought to hibernate in moist caves and mines, but winter biology is poorly documented (Adams 2003, Nagorsen and Brigham 1993). One record of a western long-eared myotis hibernating in northern Idaho has been documented; a single individual was found on 9 Jan 1996 in the Clark Fork mine on the southeastern edge of Lake Pend Oreille.

Little brown myotis

The little brown myotis occurs throughout much of the North America and Canada and as far north as Alaska and is one of the most cosmopolitan bats in the northern part of this range (Harvey et al 1999). Habitat includes arid grasslands, coastal rainforest, conifer forests, and boreal forests (Nagorsen and Brigham 1993). The little brown myotis was widespread across northern Idaho and was reported from 12 RDs: the Lochsa, North Fork, and Powell RDs (Clearwater NF), the Bonners Ferry, Coeur d'Alene River, Priest Lake,

Sandpoint, and St. Joe RDs (Idaho Panhandle NF), and the Clearwater, Moose Creek, Red River, and Salmon River RDs (Nez Perce NF) (Fig. 9).

The little brown myotis roosts in buildings, caves, rock crevices, beneath bark, and in tree cavities. Females form large maternity colonies. Males are thought to be solitary during the summer (Harvey et al .1999). Individuals forage low over water and in open areas among trees (Harvey et al. 1999), often capturing small insects such as midges (Barclay 1991).

The species hibernates in caves and mines (Harvey et al. 1999). Three hibernacula have been documented in locations near Northern Region Forests. The most recent record was from 9 January 1996 in the Clark Fork mine near Sandpoint RD. Another individual was reported from a mine near the South Fork of the Coeur d'Alene River, 1 km (0.6 mile) south of the Coeur d'Alene RD in November 1989, and a third individual was reported from the Wallowa Mountains RD on 15 January 1985. This species has been among the species most affected by white-nosed syndrome, a fatal disease caused by a pathogenic fungus that infects hibernating bats (Blehert et al. 2009). This pathogen is currently restricted to the eastern US and Europe.

Fringed myotis

The fringed myotis occurs across the western United States and Mexico (Harvey et al. 1999). This bat was one of the least commonly detected species in our dataset (Table 4) and was reported from just five RDs: the Bonners Ferry, Coeur d'Alene River, and Sandpoint RDs (Idaho Panhandle NF), and the Moose Creek and Salmon River RDs (Nez Perce NF) (Fig. 10). This information is consistent with the pattern of limited and patchy distribution that was the basis for including the fringed myotis on Idaho's Comprehensive Wildlife Conservation Strategy's list of Species of Greatest Conservation Need (IDFG 2005).

The fringed myotis inhabits a variety of habitats, including sagebrush steppe, grassland, and montane forests (Adams 2003, O'Farrell and Studier 1980). It is often found in "habitats where open areas are interspersed with mature forests, creating complex mosaics with ample edges and abundant snags" (Keinath 2004). In northern Idaho, fringed myotis have been captured most often near caves and mines or over small riparian corridors, ponds, and stock tanks in ponderosa forest and fir-pine associations.

The fringed myotis roosts in caves, mines, rock crevices, and buildings (Keinath 2004, O'Farrell and Studier 1980). The species has also been found roosting in

large, dead snags with broken tops, under loose bark, and in the long, vertical cracks of live ponderosa pine (COSEWIC 2004). Individuals are typically tightly packed together in small colonies and change roosts every few days (Cryan et al. 2001, Weller and Zabel 2001). Maternity colonies typically comprise 30–35 females and their young (Adams 2003), but groups of up to 300 females and their young have been found (Nagorsen and Brigham 1993).

The fringed myotis forages from 3 m above the ground to near the vegetative canopy (Collard et al. 1990 in COSEWIC 2004, O'Farrell and Studier 1980), capturing flying insects and gleaning prey (Bell 1980, COSEWIC 2004). Prey includes both volant and terrestrial invertebrates. Beetles and moths comprise a high proportion of prey (Black 1974, Warner 1985, Whitaker et al. 1981), although lacewings, flies, bees, spiders, crickets, and harvestmen are also taken, sometimes in large proportions (e.g., Warner 1985, Whitaker et al. 1977, Whitaker et al. 1981).

The fringed myotis hibernates in caves and mines, clinging upright on vertical walls (Nagorsen and Brigham 1993). Individuals are thought to migrate to hibernation sites, but the distance between summer and winter ranges is probably not great (Harvey et al. 1999, Keinath 2004, O'Farrell and Studier 1980). Individuals probably move short distances to lower elevations or more southern locations (O'Farrell and Studier 1980). No winter records are documented in Idaho.

Long-legged myotis

The long-legged myotis ranges from southern Alaska and western Canada, across the western United States, and south into Mexico (Harvey et al. 1999). The species was reported from 11 RDs: the Palouse RD (Clearwater NF), the Bonners Ferry, Coeur d'Alene River, Priest Lake, Sandpoint, and St. Joe RDs (Idaho Panhandle NF), and the Clearwater, Moose Creek, Red River, Salmon River, and Wallowa River RDs (Nez Perce NF) (Fig. 11).

Although sometimes found in arid habitats, the long-legged myotis generally occurs in forested montane regions (Harvey et al. 1999). Habitat is often relatively continuous tracts of late-successional forest. The individuals followed by Taylor (1999) selected the most mature forest stands available. In managed forests, the long-legged myotis avoided harvest units unless large snags and old trees were left in relatively high densities, such as in shelter woods and aggregate retention patches (Taylor 1999).

Individuals may roost in rock crevices or in buildings, but roosts are typically in tree cavities and under bark (Harvey et al. 1999; Nagorsen and Brigham 1993, Vonhof and Barclay 1996). The species has been found in ponderosa pine, quaking aspen, and Douglas-fir forests (Barclay and Kurta 2007). At sites on the eastern slopes of the Cascade Range in Washington in a coniferous forest dominated by Douglas-fir, grand fir, and ponderosa pine, Taylor (1999) found individuals selected tall grand-fir snags, which retained sheets of exfoliating bark. Similarly, Lacki, et al. (2010) found roosts used as maternity sites to typically be ~~-s~~nags that are intact at the top, in an earlier stage of decay, and possessing exfoliating bark over much of the stem surface…" In another study, Douglas-fir was used in proportion to availability, and ponderosa pine snags were used significantly less often than available (Taylor 1999). In contrast, at a study site in northern Arizona, the species used ponderosa pine almost exclusively (Rabe et al. 1998).

Night roosts include caves and mines, and in Montana, Washington, and Alberta, the species also hibernates in caves and mines (Nagorsen and Brigham 1993). There are no winter records for the long-legged myotis in northern Idaho. Maternity colonies have been found under bark, in crevices in the ground and in rock formations, and in buildings (Nagorsen and Brigham 1993). In the Wallowa Mountains RD, a maternity colony was found on 20 June 1990 in the attic of an abandoned building in the Kirkwood Creek drainage, 1.5 km (1 mile) upstream from the Snake River.

The long-legged myotis forages throughout most of the night in and above forest canopy (Harvey et al. 1999, Warner and Czaplewski 1984). At a site in southern Alberta, individuals spent most foraging time high above the ground in open habitats and along cliff edges (Saunders and Barclay 1992). The species is considered a moth specialist, but lacewings, leafhoppers, flies, termites, small beetles, and true bugs are also taken (Saunders and Barclay 1992, Warner and Czaplewski 1984). At a site in north-central Idaho, moths and beetles comprised 80% of prey, with true bugs, lacewings, caddisflies, flies, and other insects composing the balance (Johnson et al. 2007).

Yuma myotis

The Yuma myotis occurs from western British Columbia south into central Mexico, excluding the interior Great Basin of Nevada and Utah (Adams 2003, Harvey et al. 1999). The species was reported from 12 RDs: the Lochsa, North Fork, and Palouse RDs (Clearwater NF), the Bonners Ferry, Coeur d'Alene River, Priest Lake, and Sandpoint RDs (Idaho Panhandle NF), and the

Clearwater, Moose Creek, Red River, Salmon River, and Wallowa Mountains RDs (Nez Perce NF) (Fig. 12).

The distribution of Yuma myotis in Idaho is noteworthy with respect to apparent restricted distribution in Northern Region Forests in Montana. Although range maps frequently include a large portion of western and central Montana (e.g., Adams 2003, Patterson et al. 2007), distribution may not be extensive in that state (Lenard et al. 2009). In contrast, records from Idaho are widely distributed across the Northern Region Forests in Idaho, up to the Montana border.

The Yuma myotis occupies a broad variety of habitats, including sagebrush associations and many forest types. Within these, the species is often closely associated with rivers, riparian areas and wet meadows (Adams 2003, Harvey et al 1999, Nagorsen and Brigham 1993). Although individuals sometimes roost in tree cavities, the species usually roosts in caves, mines, and buildings (Barclay and Kurta 2007, Harvey et al 1999; Nagorsen and Brigham 1993). Brigham et al. (1997) found individuals roosted most often beneath loose bark in large snags of intermediate decay. Prey includes moths, beetles, caddisflies, lacewings, mayflies, bees, leafhoppers, flies, and termites (Adams 2003, Whitaker et al. 1981).

The Yuma myotis forms large nursery colonies in caves, mines, buildings, and under bridges (Harvey et al. 1999). Females in maternity colonies are susceptible to disturbance and will quickly abandon the site if disturbed (Harvey et al. 1999). In the northern portion of the species‘ range, caves are often too cool for maternity colonies; buildings are usually used instead (Betts 1997). An interesting exception occurs in the Kirkwood Creek drainage, 1.25 km (0.75 mile) upstream from the Snake River in the Wallowa Mountains RD, where maternity colonies were found in 3 abandoned mines. One mine supported 50–60 individuals; the others each contained 500–750 individuals. Betts (1997) concluded while the mines were warm, the bats were not selecting the warmest mines in the area, but preferred the high relative humidity (>90% through the maternity period) supplied by water in the mines. There are no winter records for Yuma myotis in northern Idaho.

The Yuma myotis is difficult to distinguish morphologically from the little brown myotis (e.g., WBWG 2007). The two species frequently could not be distinguished in the field within our datasets. Additional effort may be needed to verify identification using specimens or voucher acoustic recordings. Specimen data confirms both species were present at several survey locations on the same

evenings, including sites in the North Fork RD (Clearwater NF), Bonners Ferry and Sandpoint RDs (Idaho Panhandle NF), and Clearwater RD (Nez Perce NF).

Townsend's big-eared bat

The Townsend's big-eared bat ranges from southern British Columbia across the western United States to southern Mexico, and disjunct populations occur in the eastern United States (Harvey et al. 1999). The species was reported from nine RDs: the West Fork (Bitterroot NF), the Lochsa (Clearwater NF), the Bonners Ferry, Priest Lake, and Sandpoint RDs (Idaho Panhandle), and the Clearwater, Moose Creek, Salmon River, and Wallowa Mountains RDs (Nez Perce NF) (Fig. 13).

The Townsend's big-eared bat occupies a variety of habitats, such as desert scrub, sagebrush shrubland, and ponderosa pine, spruce-fir, and mixed hardwood-conifer forests (Pierson et al. 1999). The species roosts in large, hollow redwood trees in California (Fellers and Pierson 2002, Mazurek 2004). Most often roosts are in caves, mines, and buildings (Pierson et al. 1993, Nagorsen and Brigham 1993). Maternity colonies usually comprise less than 100 adults and occur in caves (Kunz and Martin 1982). The species is vulnerable to human disturbance at roost sites, and maternity colonies are particularly sensitive to disturbance; individuals may permanently abandon maternity roost sites if disturbed (Humphrey and Kunz 1976). Summer roosting habits of males is not well-documented, but individuals or small groups are occasionally encountered day-roosting at caves.

Foraging occurs along forest edges (Kunz and Martin 1982), along riparian courses, over shrubs, and sometimes within caves. Individuals may glean some prey from vegetation or rock faces. The species specializes in capturing small moths, 3 to 10 mm in length (Kunz and Martin 1982, Nagorsen and Brigham 1993). Prey also includes lacewings, flies, beetles, caddisflies, stoneflies, and true bugs, but moths usually comprise over 90% of diet (Kunz and Martin 1982, Pierson et al. 1999, Whitaker et al. 1977).

This species hibernates in caves or mines, usually in exposed locations rather than in recessed sites (Kunz and Martin 1982). The species is not known to undertake long-distance migrations (Harvey et al. 1999, Kunz and Martin 1982), but individuals may undertake local 10 to 65-km migrations between summer and winter habitat (Nagorsen and Brigham 1993). Hibernacula occur in several abandoned mines in northern Idaho. Two of these are in or near the Sandpoint

RD, two sites are in the Bonners Ferry RD, and one site is in eastern Clearwater County. Hibernacula in southern Idaho are often in lava-tube caves.

Pallid bat

The pallid bat occurs across the Great Basin and southwestern United States in association with desert and semi-desert habitats, such as canyons, desert washes, and desert scrub situations. Individuals roost in rock crevices, caves, and occasionally buildings. Prey is usually captured on the ground and consists of large-bodied arthropods, such as large crickets, scorpions, and beetles.

The pallid bat has been reported from two locations in northern Idaho (Fig. 14). One record, in southern Nez Perce County, is a 1994 echolocation call, and the other represented a pallid bat that flew through an open window into a home in Grangeville in autumn 1959; this bat was retained as a specimen. The remaining 23 pallid bats reported in the state were found in southern Idaho, from Owyhee County and Boise, east to Pocatello.

Distribution in north and central Idaho would be expected to be most likely within the low-elevation canyons, such as Hell's Canyon and the Salmon River canyon. Based on specimen and capture data, the pallid bat may occur in the Wallowa Mountains, Salmon River, and Clearwater RDs (Nez Perce NF), and in the Lochsa RD (Clearwater NF). Patterson et al. (2007) mapped the range of pallid bats diagonally across much of northwestern Idaho, including at least portions of all four Forests, including the Red River RD and small portions of the Moose Creek and West Fork RDs, and most of the Palouse RD and the western portion of the St. Joe RD.

Spotted bat

The spotted bat is a species that occurs predominately in low-elevation habitats associated with rock cliff faces in desert washes and canyons. Roosting sites are in cracks and recesses in cliff walls. The spotted bat is usually detected on the basis of characteristic echolocation calls that are within the frequency range audible to humans. Individuals forage at heights above the ground that put them out of the range of most mist-net arrangements, so the species is seldom captured with standard mist-net configurations. The species has been detected near the Wallowa Mountain RD, just across the Snake River on the Oregon side of Hell's Canyon (unverified vocalization) and ca. 30 river-km (19 miles) north of the Wallowa Mountains RD, at the confluence of the Salmon and Snake Rivers (Fig. 15). The species has also been reported ca. 30–60 km (20–30 miles) south of West Fork and Red River RDs, and is represented by acoustic data at two

locations on Big Creek and a capture on the Middle Fork of the Salmon River. There was also one confirmed sighting (photo) in the Salmon River drainage south of Challis. All other spotted bat records in Idaho were from southwest Idaho, roughly south of the Snake River, in Owyhee, southern Canyon, Twin Falls, and southern Jerome counties.

Patterson et al. (2007) mapped the range of the spotted bat throughout all of northern Idaho, extending north to Jasper Provencal Park in British Columbia. This probably greatly overestimates the distribution of populations in the state; distribution is expected to be associated only with low-elevation cliff and canyon habitat types. Occupied habitat may be present in the Nez Perce NF, such as portions of the Wallowa Mountains, Salmon River, Red River, and Clearwater RDs.

Canyon bat

The canyon bat, formerly known by the common name western pipistrelle, occurs in low-elevation habitat consisting of desert scrub, shrub steppe, and other xeric vegetation assemblages, but also occurs in xeric grassland and open woodland habitat. The canyon bat has been captured at two locations in mist net surveys north of Wallowa Mountains and Salmon River RDs—in Hell's Canyon and along the Salmon River in southern Nez Perce County (Fig. 16). An acoustic record from Spring Bar pond near the southern edge of the Salmon River RD was tentatively identified as either a canyon bat or a silver-haired bat. Another acoustic record in the Salmon River RD, east of the Little Salmon River may also have represented another species. The remaining records were from southwest Idaho, in or near Owyhee County.

The two canyon bats captured in northern Idaho and the possible acoustic records are at the eastern edge of the range given by Patterson et al. (2007). Based on the combination of these locations and the range given by Patterson et al. (2007), the canyon bat may be present in the western RDs of Nez Perce NF, most likely the Wallowa Mountains, Salmon River, and/or Clearwater RDs and possibly the western portion of the Red River RD.

Western red bat

The western red bat has yet to be conclusively documented to occur in Idaho. The known distribution generates a U-shaped pattern from southwestern British Columbia across Washington and Oregon west of the Cascade Range, California, Arizona and southwest New Mexico, and north into eastern Utah (Adams 2003, Harvey et al. 1999). Patterson et al. (2007) projected the range

north and east across Colorado, Wyoming, Montana, and much of Idaho and south across Mexico and most of South America; however records are not known from these states.

The 2005-2008 USFS acoustic dataset contained records based on identification of the western red bat from acoustic surveys at three sites in the Northern Region Forests (Fig. 17). Two recordings from the Foursquare mine adit in the Coeur d'Alene River RD on 8 September 2005 were identified as the western red bat. Possible western red bat calls were also recorded in the Salmon River RD in two locations (due to scale, these sites display as one location on Fig. 17). The first was on the west side of the Little Salmon River in early August 2005. The second recording was from late August 2007 at a site east of the Little Salmon River. The recording from the Little Salmon River during 2007 was irresolvable between western red bat and canyon bat.

Although the western red bat has not been confirmed to occur in Idaho, additional potential records are known. A call irresolvable between western red bat and little brown myotis was recorded in the Caribou–Targhee NF (Intermountain Region) (2005-2008 Northern Region dataset). Calls recorded in south-central Idaho also resembled red bat calls (R.W. Doering, pers. comm.).

Short duration calls of western red bats may be confused with long duration calls of little brown myotis (J. Tyburec, pers. comm.), a species also present at the Foursquare mine adit and at Salmon River site during the survey when the western red bat recordings were recorded. The western red bat echolocation call is also similar to that of a closely related species, the eastern red bat (WBWG 2007). The eastern red bat (*Lasiurus borealis*) ranges west into most of Alberta and south through Montana and along the eastern edge of Wyoming to northeastern Mexico (Harvey et al. 1999). Although Idaho records are potentially misidentifications, the interpretation of these echolocation sonograms is largely conjectural without corroborating data.

Both species of red bats are thought to migrate southward from the colder portions of their ranges (Harvey et al. 1999). Nagorsen and Brigham (1993) considered the two records in the Skagit and Okanagan valleys to represent isolated populations at the northern edge of the species' summer range.

Brazilian free-tailed bat

The Brazilian free-tailed bat occurs at southern latitudes in North America. In the United States, the known range extends north to north-central Utah and Nevada

and into the southwest corner of Oregon (Harvey et al. 1999). Southwest populations migrate long distances into Mexico to overwinter (Harvey et al. 1999).

All potential records of this species in Idaho have been based on echolocation sonograms. Although calls are distinctive, sonograms of other bats may resemble free-tailed bat calls under some circumstances, creating a potential for misidentification. Three echolocation sequences identified as the Brazilian free-tailed bat were recorded at the Foursquare mine adit on 8 September 2005 in the Coeur d'Alene River RD (Fig. 18). Two additional calls were recorded near the Panhandle NF at a location 0.5 km (0.25 mile) south of Sandpoint RD, in early August 2006. One of these was identified as irresolvable between Brazilian free-tailed bat and big brown bat, and the other may have been Brazilian free-tailed bat or silver-haired bat. Silver-haired bats were reported from this location during the same survey.

Irresolvable records were also reported from Nez Perce NF, in the Clearwater RD. One recording, captured on 15 August 2006, was identified as big brown bat, silver-haired bat, or Brazilian free-tailed bat; the other as silver-haired bat or Brazilian free-tailed bat; the only other species reported were hoary bat and little brown myotis. In the Red River RD, a recording from 13 September 2006 was identified as silver-haired bat or Brazilian free-tailed bat.

In addition, IDFG's database contained two previously reported potential Brazilian free-tailed bat records, also based on acoustic data. Both of these were recorded in southern Owyhee County in September 1995. The researcher characterized these records as ~~"p~~possible" Brazilian free-tailed bat calls.

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Tables

Table 1. Conservation rankings of northern Idaho bat species: global ranks (GRank), state ranks (SRank), Northern Region National Forest Sensitive Species (NR), and Idaho Species of Greatest Conservation Need (SGCN).

Species	GRank	SRank	NR	SGCN
Pallid bat	G5	S3		x
Big brown bat	G5	S4		
Spotted bat	G4	S3	x	x
Silver-haired bat	G5	S4		
Hoary bat	G5	S4		
California myotis	G5	S2		x
Western small-footed myotis	G5	S4		
Long-eared myotis	G5	S3	x	
Little brown myotis	G5	S5		
Fringed myotis	G4G5	S2	x	x
Long-legged myotis	G5	S3	x	
Yuma myotis	G5	S3		
Townsend's big-eared bat	G4	S3	x	x
Canyon bat	G5	S3		

Table 2. Number of Ranger Districts (RD) having conclusive, confirmed, and potential species records.

Species		No. of RDs		
		Conclusive	Confirmed	Potential
Big brown bat	*Eptesicus fuscus*	0	7	1
Silver-haired bat	*Lasionycteris noctivagans*	2	10	1
Hoary bat	*Lasiurus cinereus*	0	6	4
California myotis	*Myotis californicus*	2	8	1
Western small-footed myotis	*Myotis ciliolabrum*	1	4	2
Long-eared myotis	*Myotis evotis*	2	9	0
Little brown myotis	*Myotis lucifugus*	5	5	2
Fringed myotis	*Myotis thysanodes*	0	5	0
Long-legged myotis	*Myotis volans*	1	10	0
Yuma myotis	*Myotis yumanensis*	7	3	2
Townsend's big-eared bat	*Corynorhinus townsendii*	1	8	0
Canyon bat	*Parastrellus hesperus*	0	0	1
Western red bat	*Lasiurus blossevillii*	0	0	2
Brazilian free-tailed bat	*Tadarida brasiliensis*	0	0	3

Table 3. Species lists for each Ranger District (RD) in Northern Region National Forests in Idaho.

		Conclusive	Confirmed	Potential
BITTERROOT NF				
West Fork RD				
Townsend's big-eared bat	*Corynorhinus townsendii*		x	
CLEARWATER NF				
Lochsa RD				
Big brown bat	*Eptesicus fuscus*			x
Silver-haired bat	*Lasionycteris noctivagans*		x	x
Hoary bat	*Lasiurus cinereus*		x	x
California myotis	*Myotis californicus*		x	x
Little brown myotis	*Myotis lucifugus*			x
Yuma myotis	*Myotis yumanensis*			x
Townsend's big-eared bat	*Corynorhinus townsendii*		x	
North Fork RD				
Big brown bat	*Eptesicus fuscus*		x	
Silver-haired bat	*Lasionycteris noctivagans*		x	x
Hoary bat	*Lasiurus cinereus*			x
California myotis	*Myotis californicus*			x
Western small-footed myotis	*Myotis ciliolabrum*		x	x
Long-eared myotis	*Myotis evotis*		x	x
Little brown myotis	*Myotis lucifugus*			x
Yuma myotis	*Myotis yumanensis*	x		
Palouse RD				
Big brown bat	*Eptesicus fuscus*		x	
Silver-haired bat	*Lasionycteris noctivagans*		x	
Hoary bat	*Lasiurus cinereus*		x	
California myotis	*Myotis californicus*		x	
Long-eared myotis	*Myotis evotis*		x	
Long-legged myotis	*Myotis volans*		x	
Yuma myotis	*Myotis yumanensis*		x	

		Conclusive	Confirmed	Potential
Powell RD				
Silver-haired bat	*Lasionycteris noctivagans*		x	
Little brown myotis	*Myotis lucifugus*		x	
IDAHO PANHANDLE NF				
Bonners Ferry RD				
Silver-haired bat	*Lasionycteris noctivagans*			x
Hoary bat	*Lasiurus cinereus*			x
California myotis	*Myotis californicus*		x	
Western small-footed myotis	*Myotis ciliolabrum*	x		
Long-eared myotis	*Myotis evotis*		x	x
Little brown myotis	*Myotis lucifugus*	x	x	x
Fringed myotis	*Myotis thysanodes*		x	x
Long-legged myotis	*Myotis volans*	x	x	x
Yuma myotis	*Myotis yumanensis*	x		
Townsend's big-eared bat	*Corynorhinus townsendii*		x	
Cabinet RD				
No records				
Coeur d'Alene River RD				
Big brown bat	*Eptesicus fuscus*		x	x
Silver-haired bat	*Lasionycteris noctivagans*		x	x
Hoary bat	*Lasiurus cinereus*			x
California myotis	*Myotis californicus*		x	x
Western small-footed myotis	*Myotis ciliolabrum*			x
Long-eared myotis	*Myotis evotis*		x	x
Little brown myotis	*Myotis lucifugus*	x	x	x
Fringed myotis	*Myotis thysanodes*		x	x
Long-legged myotis	*Myotis volans*		x	x
Yuma myotis	*Myotis yumanensis*			x
Western red bat	*Lasiurus blossevillii*			x
Brazilian free-tailed bat	*Tadarida brasiliensis*			x

		Conclusive	Confirmed	Potential
Priest Lake RD				
Silver-haired bat	*Lasionycteris noctivagans*	x		
Long-eared myotis	*Myotis evotis*	x	x	
Little brown myotis	*Myotis lucifugus*	x	x	
Long-legged myotis	*Myotis volans*		x	
Yuma myotis	*Myotis yumanensis*	x		
Townsend's big-eared bat	*Corynorhinus townsendii*	x	x	
Sandpoint RD				
Big brown bat	*Eptesicus fuscus*		x	x
Silver-haired bat	*Lasionycteris noctivagans*		x	x
Hoary bat	*Lasiurus cinereus*		x	x
California myotis	*Myotis californicus*		x	x
Western small-footed myotis	*Myotis ciliolabrum*		x	x
Long-eared myotis	*Myotis evotis*		x	x
Little brown myotis	*Myotis lucifugus*	x	x	x
Fringed myotis	*Myotis thysanodes*		x	x
Long-legged myotis	*Myotis volans*		x	x
Yuma myotis	*Myotis yumanensis*	x		x
Townsend's big-eared bat	*Corynorhinus townsendii*		x	x
St. Joe RD				
Silver-haired bat	*Lasionycteris noctivagans*	x		
California myotis	*Myotis californicus*	x	x	
Long-eared myotis	*Myotis evotis*		x	
Little brown myotis	*Myotis lucifugus*		x	
Long-legged myotis	*Myotis volans*		x	
Three Rivers RD				
No records				
NEZ PERCE NF				
Clearwater RD				
Big brown bat	*Eptesicus fuscus*		x	x
Silver-haired bat	*Lasionycteris noctivagans*		x	x

		Conclusive	Confirmed	Potential
Hoary bat	*Lasiurus cinereus*		x	x
California myotis	*Myotis californicus*		x	x
Western small-footed myotis	*Myotis ciliolabrum*		x	x
Long-eared myotis	*Myotis evotis*		x	x
Little brown myotis	*Myotis lucifugus*	x	x	x
Long-legged myotis	*Myotis volans*		x	x
Yuma myotis	*Myotis yumanensis*	x	x	
Townsend's big-eared bat	*Corynorhinus townsendii*		x	
Brazilian Free-tailed bat	*Tadarida brasiliensis*			x
Moose Creek RD				
Big brown bat	*Eptesicus fuscus*		x	x
Silver-haired bat	*Lasionycteris noctivagans*		x	x
Hoary bat	*Lasiurus cinereus*			x
California myotis	*Myotis californicus*	x	x	x
Western small-footed myotis	*Myotis ciliolabrum*		x	
Long-eared myotis	*Myotis evotis*	x	x	x
Little brown myotis	*Myotis lucifugus*		x	x
Fringed myotis	*Myotis thysanodes*		x	
Long-legged myotis	*Myotis volans*		x	
Yuma myotis	*Myotis yumanensis*	x	x	x
Townsend's big-eared bat	*Corynorhinus townsendii*		x	
Red River RD				
Silver-haired bat	*Lasionycteris noctivagans*		x	x
Hoary bat	*Lasiurus cinereus*		x	x
California myotis	*Myotis californicus*		x	x
Long-eared myotis	*Myotis evotis*		x	x
Little brown myotis	*Myotis lucifugus*		x	x
Long-legged myotis	*Myotis volans*		x	
Yuma myotis	*Myotis yumanensis*		x	x
Brazilian Free-tailed bat	*Tadarida brasiliensis*			x
Salmon River RD				
Big brown bat	*Eptesicus fuscus*		x	x
Silver-haired bat	*Lasionycteris noctivagans*	x	x	x

		Conclusive	Confirmed	Potential
Hoary bat	*Lasiurus cinereus*		x	x
California myotis	*Myotis californicus*		x	x
Western small-footed myotis	*Myotis ciliolabrum*			x
Long-eared myotis	*Myotis evotis*		x	x
Little brown myotis	*Myotis lucifugus*		x	x
Fringed myotis	*Myotis thysanodes*		x	x
Long-legged myotis	*Myotis volans*		x	x
Yuma myotis	*Myotis yumanensis*		x	
Townsend's big-eared bat	*Corynorhinus townsendii*		x	x
Canyon bat[+]	*Parastrellus hesperus*			x
Western red bat	*Lasiurus blossevillii*			x
Wallowa Mountains RD				
Long-legged myotis	*Myotis volans*		x	
Yuma myotis	*Myotis yumanensis*	x	x	
Townsend's big-eared bat	*Corynorhinus townsendii*		x	

[+] Single acoustic record irresolvable between canyon bat and western red bat.

Table 4. Distribution of bat records by National Forest and Ranger District. Records include conclusive (X), confirmed (x), and potential (p) species records reported from Ranger Districts. National Forests are Bitterroot National Forest (BNF), Clearwater National Forest (CNF), Idaho Panhandle National Forest (IPNF), and Nez-Perce National Forest (NPNF).

		BNF	CNF				IPNF							NPNF				
Species		West Fork RD	Lochsa RD	North Fork RD	Palouse RD	Powell RD	Bonners Ferry RD	Cabinet RD	Coeur d'Alene River	Priest Lake RD	Sandpoint RD	St. Joe RD	Three Rivers RD	Clearwater RD	Moose Creek RD	Red River RD	Salmon River RD	Wallowa Mountains RD
Big brown bat	*Eptesicus fuscus*		p	x	x				x		x			x	x		x	
Silver-haired bat	*Lasionycteris noctivagans*		x	x	x	x	p		x	**X**	x	x		x	x	x	**X**	
Hoary bat	*Lasiurus cinereus*		x	p	x		p		p		x			x	p	x	x	
California myotis	*Myotis californicus*		x	p	x		x		x		x	**X**		x	**X**	x	x	
Western small-footed myotis	*Myotis ciliolabrum*			x			**X**		p		x			x	x		p	
Long-eared myotis	*Myotis evotis*			x	x		x		x	**X**	x	x		x	**X**	x	x	
Little brown myotis	*Myotis lucifugus*		p	p		x	**X**		**X**	**X**	**X**	x		**X**	x	x	x	
Fringed myotis	*Myotis thysanodes*						x		x		x				x		x	
Long-legged myotis	*Myotis volans*				x		**X**		x	x	x	x		x	x	x	x	x
Yuma myotis	*Myotis yumanensis*		p	**X**	x		**X**		p	**X**	**X**			**X**	**X**	x	x	**X**
Townsend's big-eared bat	*Corynorhinus townsendii*	x	x				x			**X**	x			x	x		x	x
Canyon bat	*Parastrellus hesperus*																p	
Western red bat	*Lasiurus blossevillii*								p								p	
Brazilian free-tailed bat	*Tadarida brasiliensis*								p					p		p		

Figures

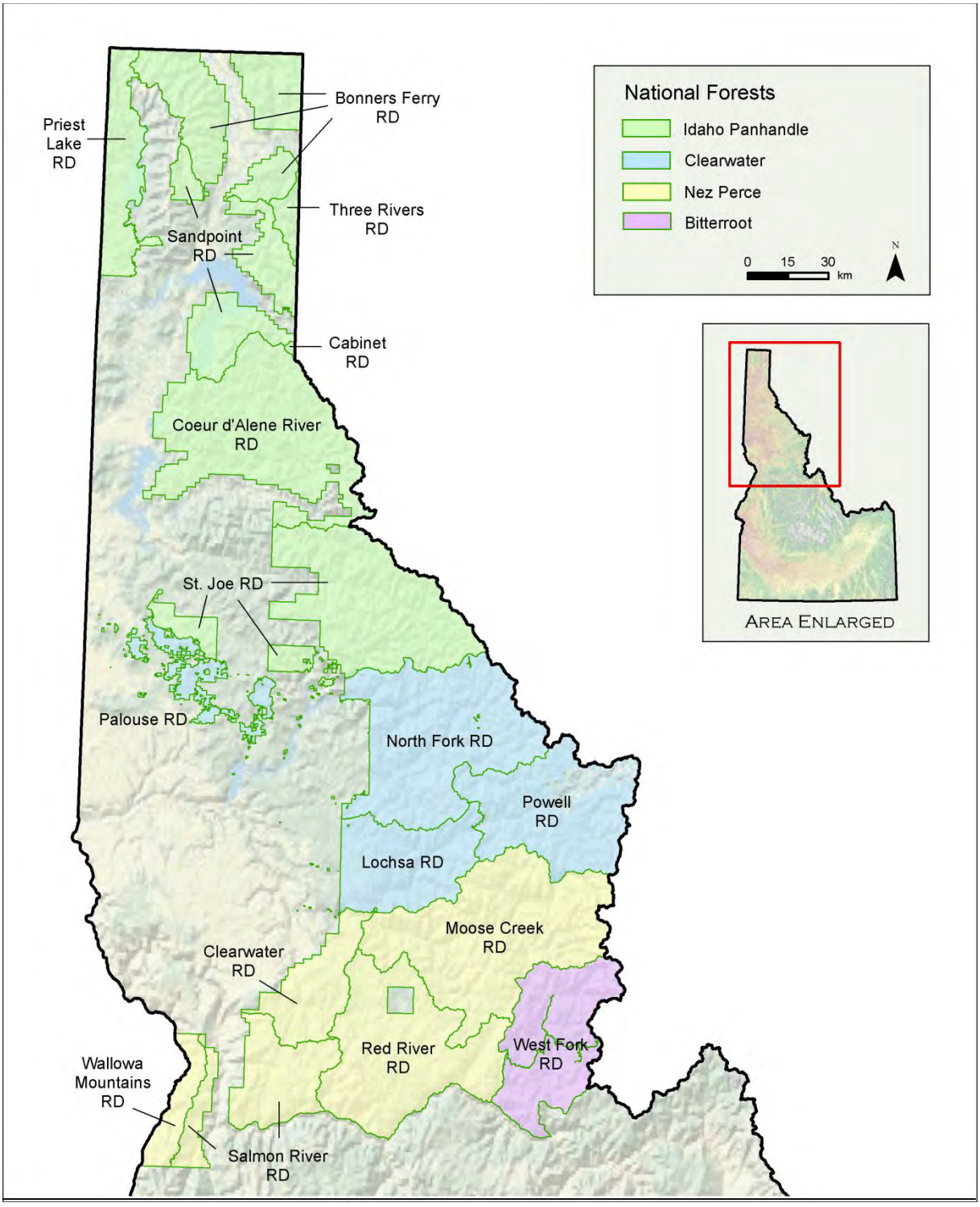

Figure 1. Northern Region National Forests and Ranger Districts in Idaho.

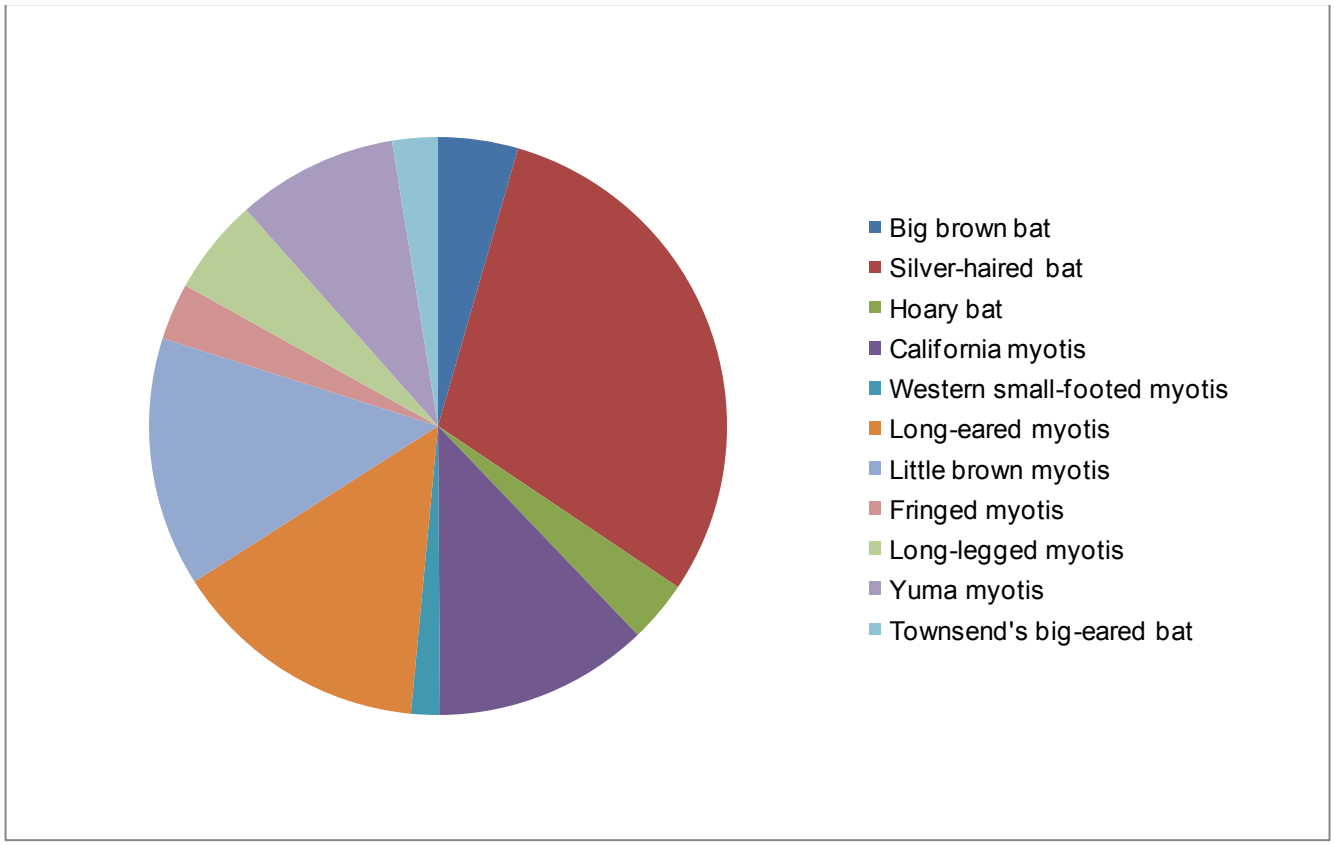

Figure 2. Proportion of the dataset represented by each species in Northern Region National Forests in Idaho.

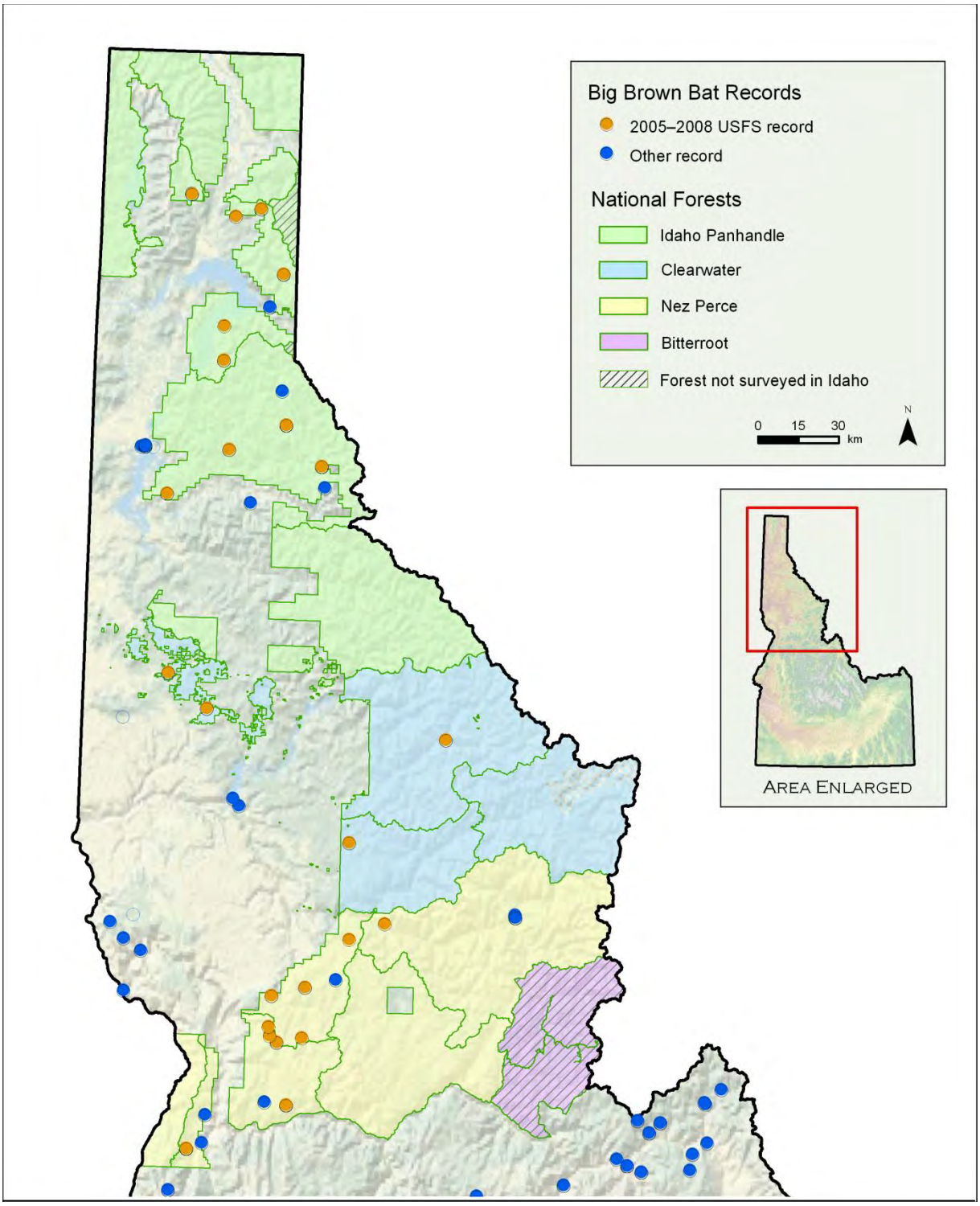

Figure 3. Distribution of big brown bat (*Eptesicus fuscus*) records in northern Idaho.

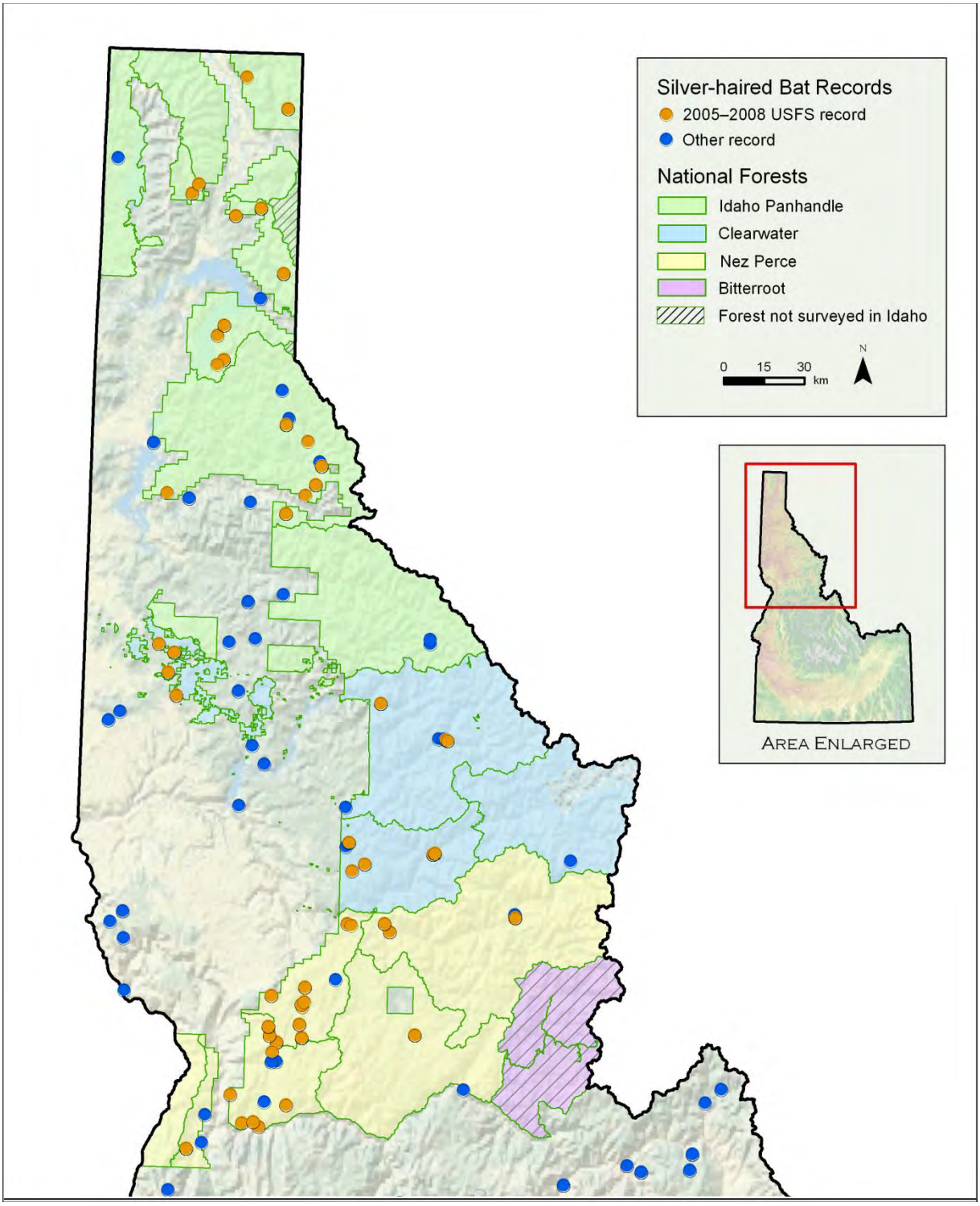

Figure 4. Distribution of silver-haired bat (*Lasionycteris noctivagans*) records in northern Idaho.

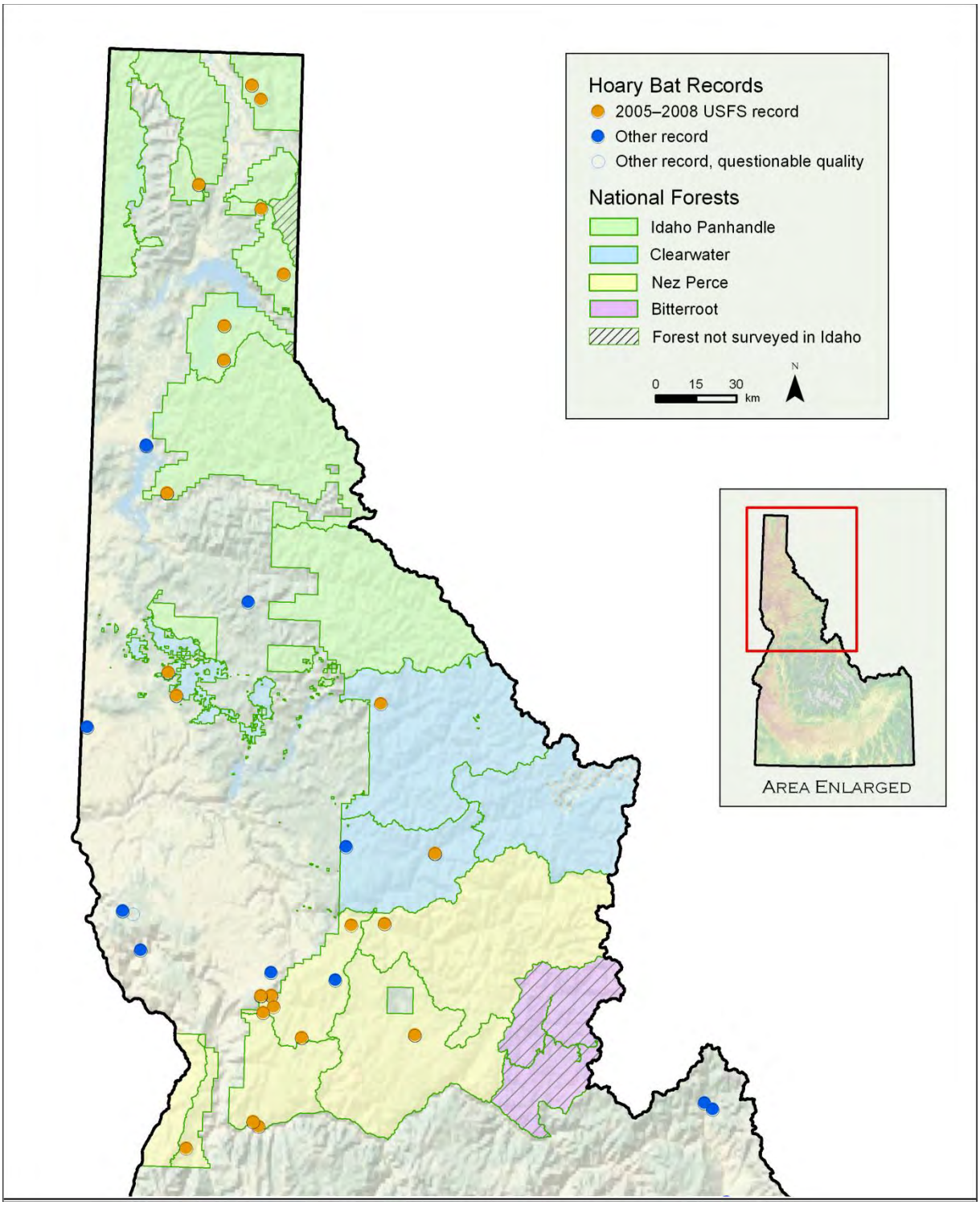

Figure 5. Distribution of hoary bat (*Lasiurus cinereus*) records in northern Idaho.

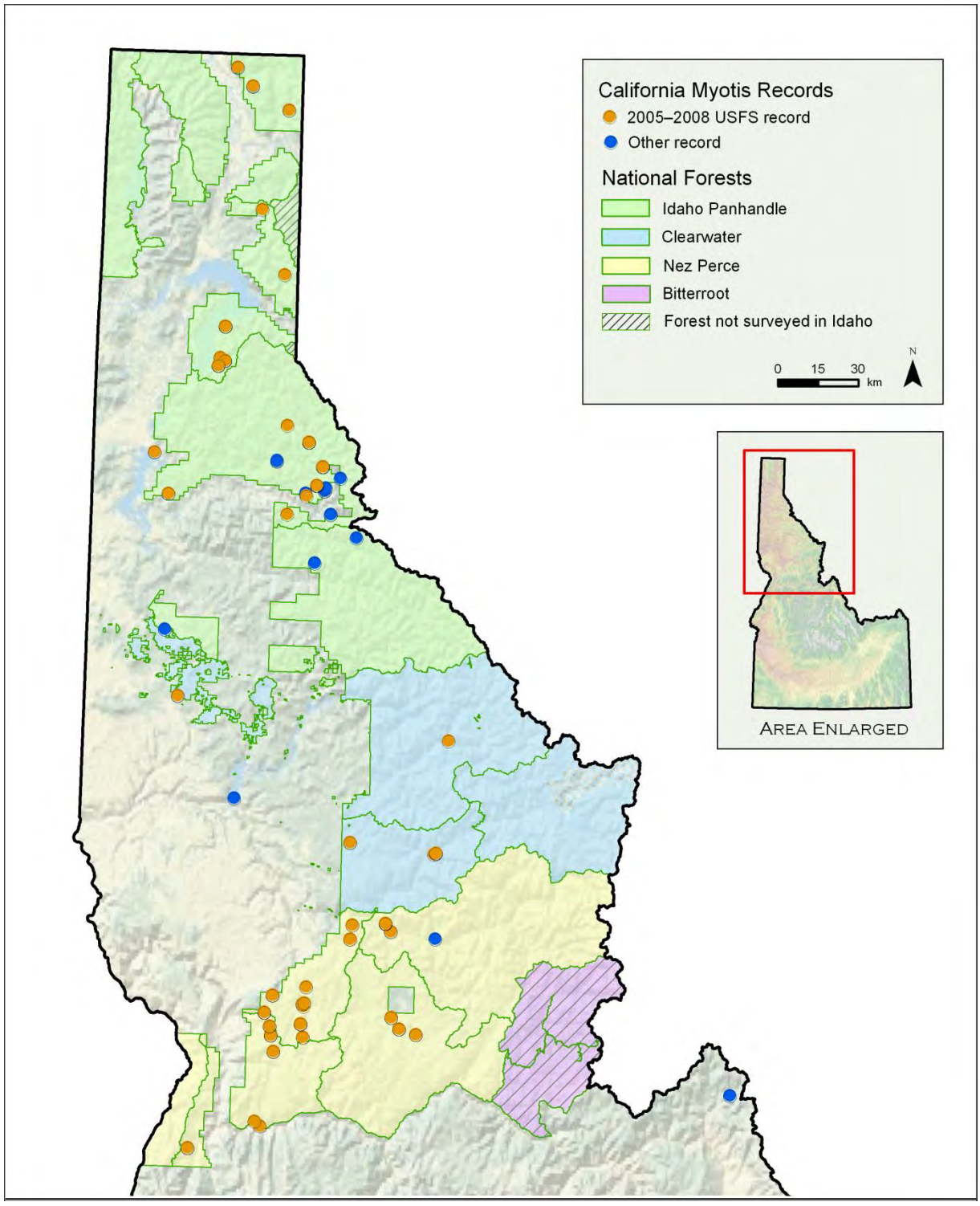

Figure 6. Distribution of California myotis (*Myotis californicus*) records in northern Idaho. The California myotis is designated as a Species of Greatest Conservation Need in Idaho's Comprehensive Wildlife Conservation Strategy.

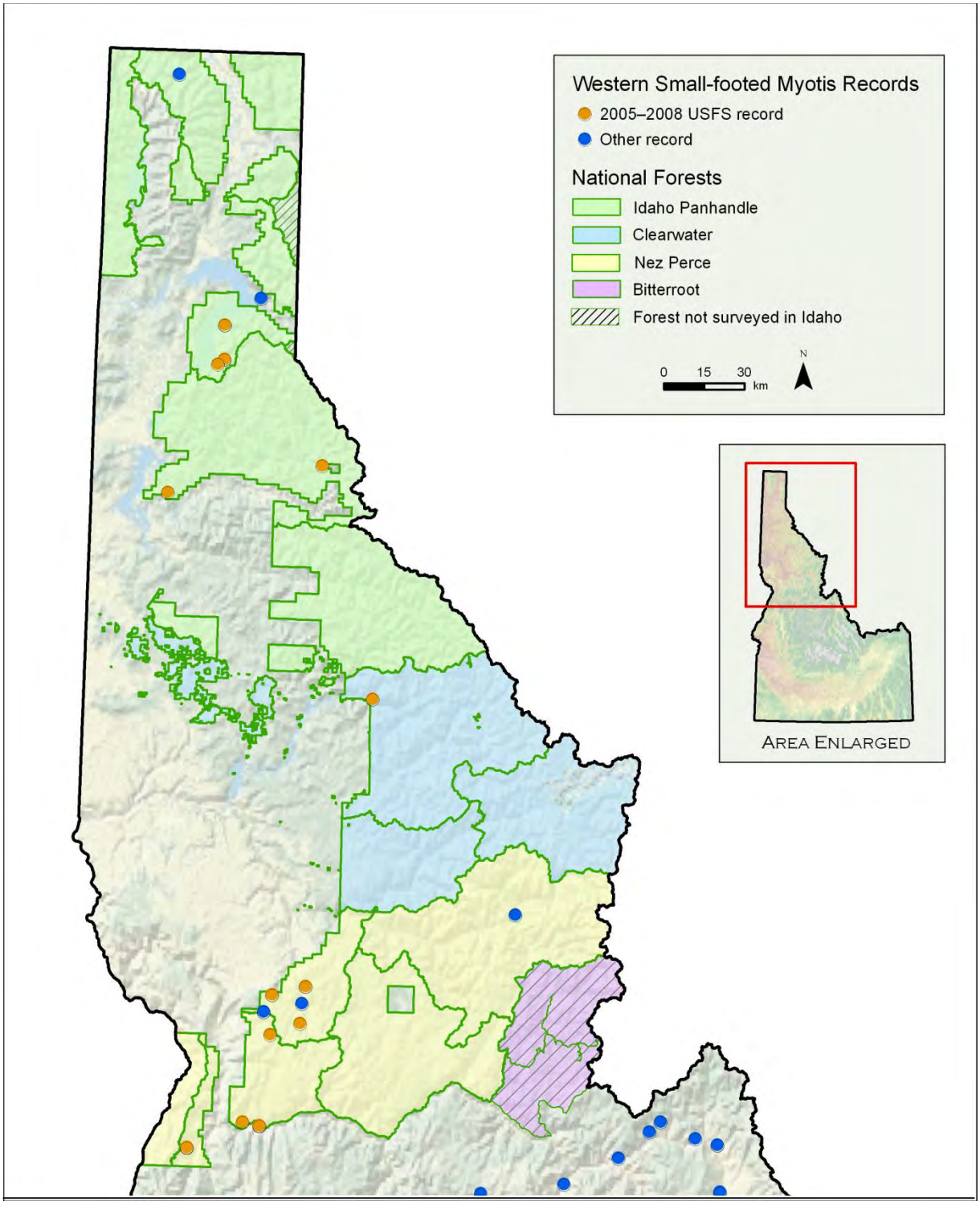

Figure 7. Distribution of western small-footed myotis (*Myotis ciliolabrum*) records in northern Idaho.

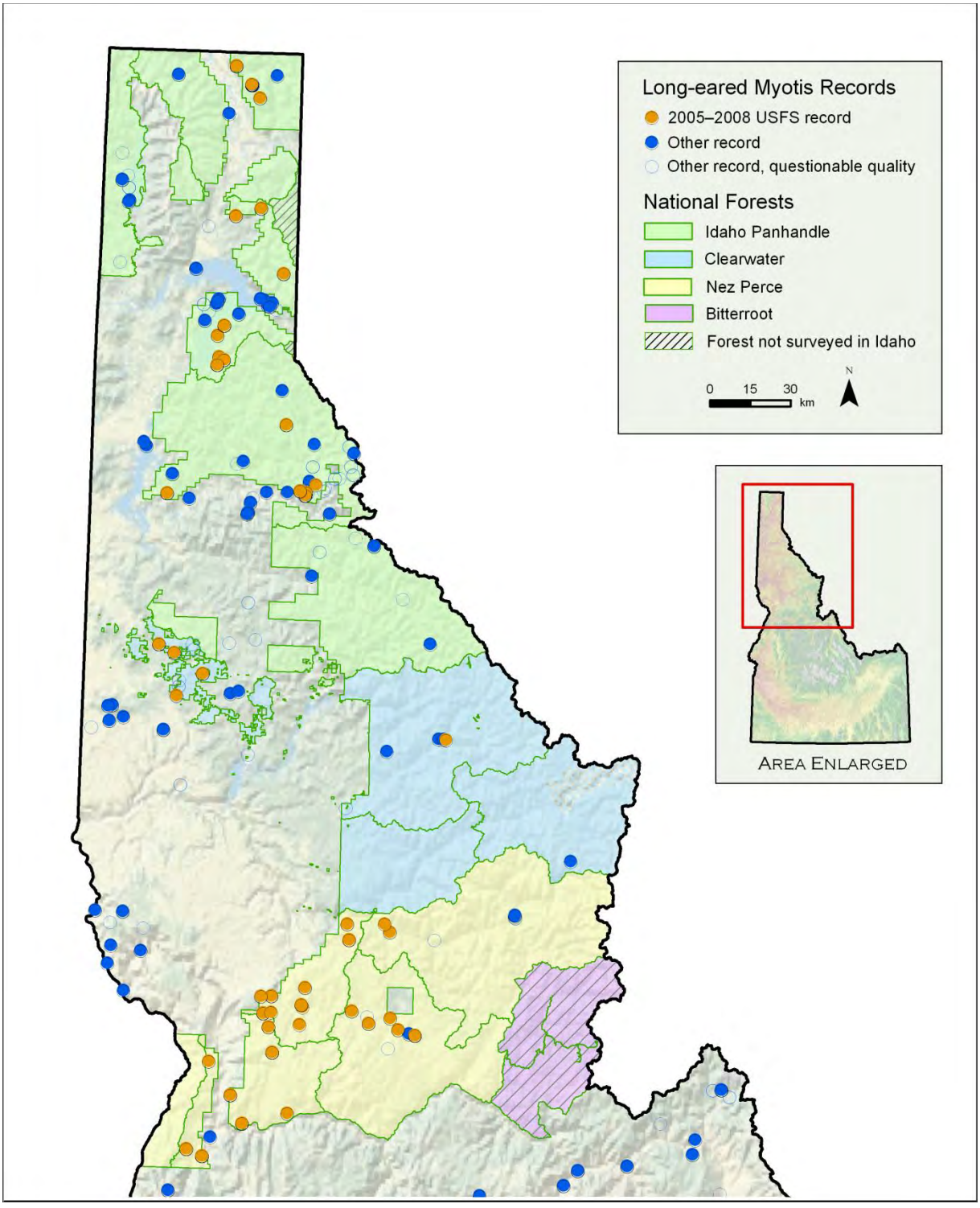

Figure 8. Distribution of long-eared myotis (*Myotis evotis*) records in northern Idaho. The long-eared myotis is designated as a Northern Region sensitive species.

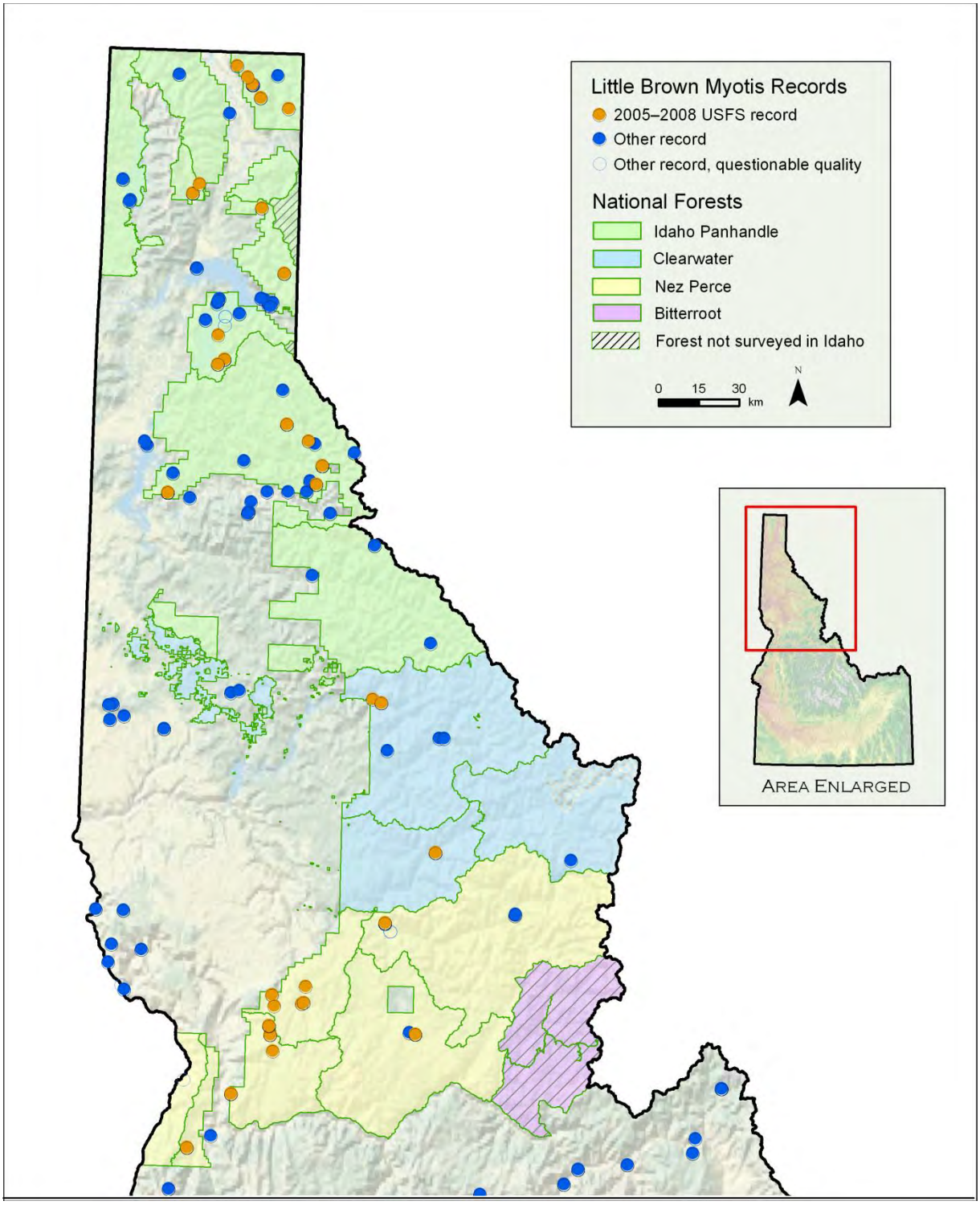

Figure 9. Distribution of little brown myotis (*Myotis lucifugus*) records in northern Idaho.

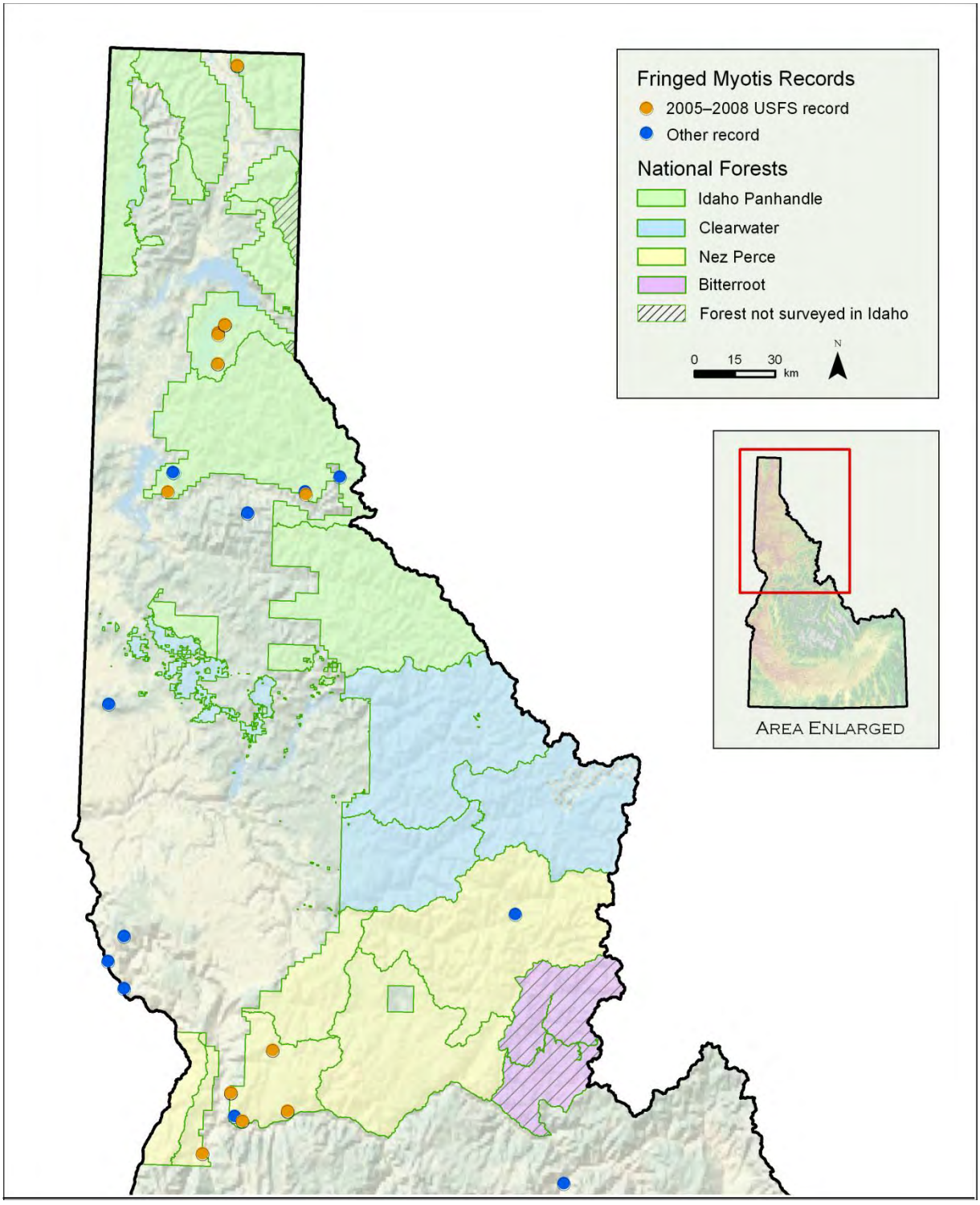

Figure 10. Distribution of fringed myotis (*Myotis thysanodes*) records in northern Idaho. The fringed myotis is designated as a Species of Greatest Conservation Need in Idaho's Comprehensive Wildlife Conservation Strategy, and is designated as a Northern Region sensitive species.

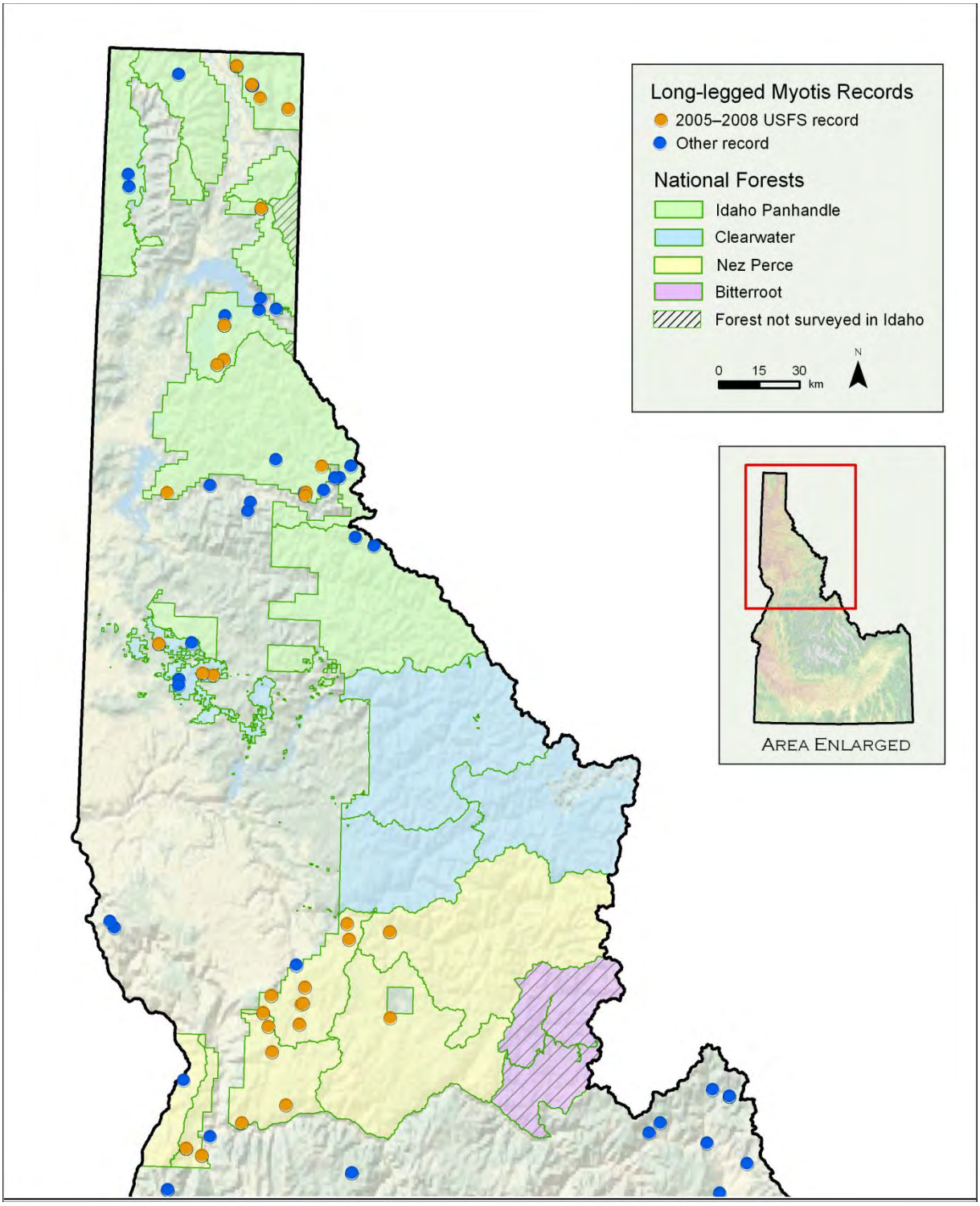

Figure 11. Distribution of long-legged myotis (*Myotis volans*) records in northern Idaho. The long-legged myotis is designated as a Northern Region sensitive species.

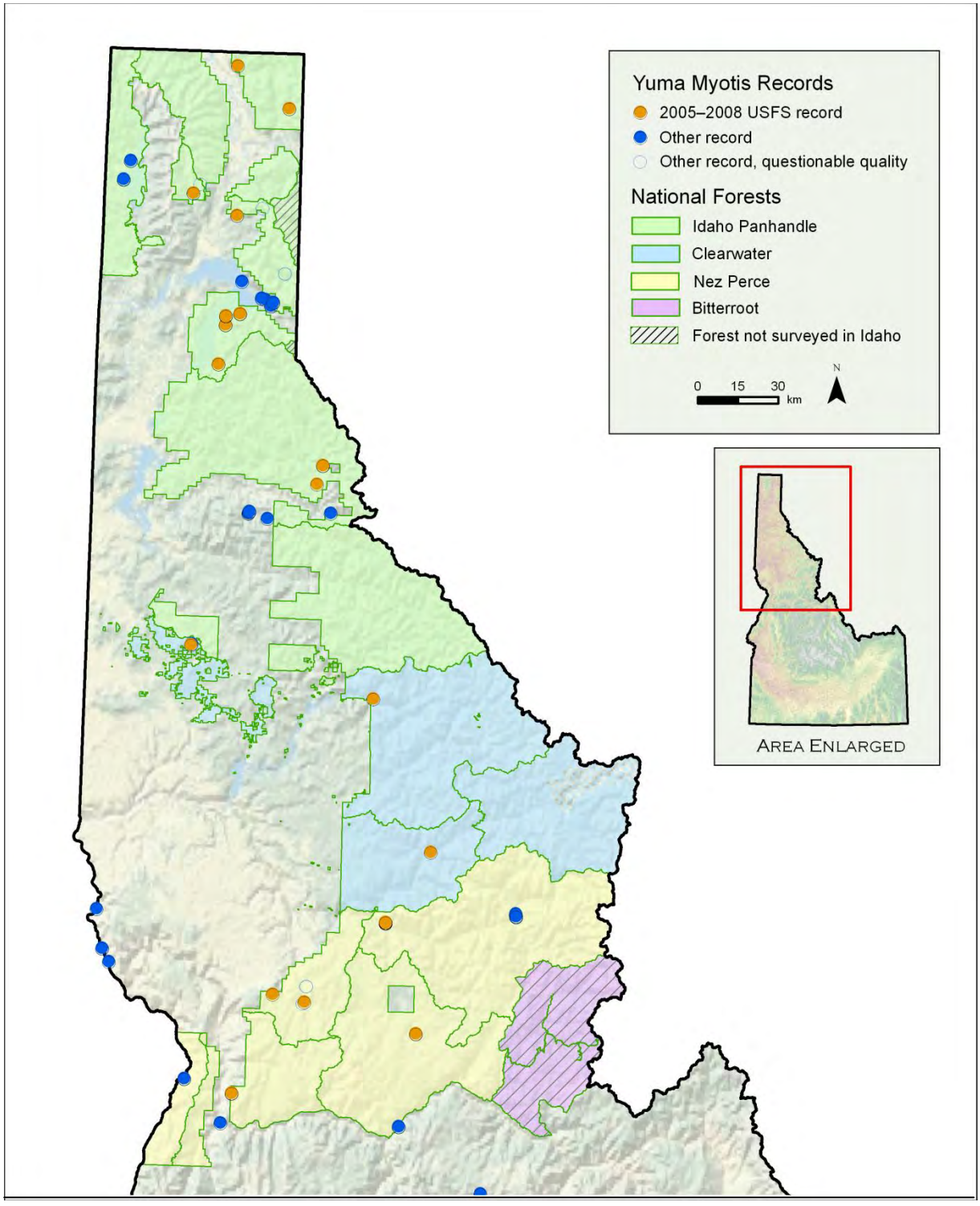

Figure 12. Distribution of Yuma myotis (*Myotis yumanensis*) records in northern Idaho.

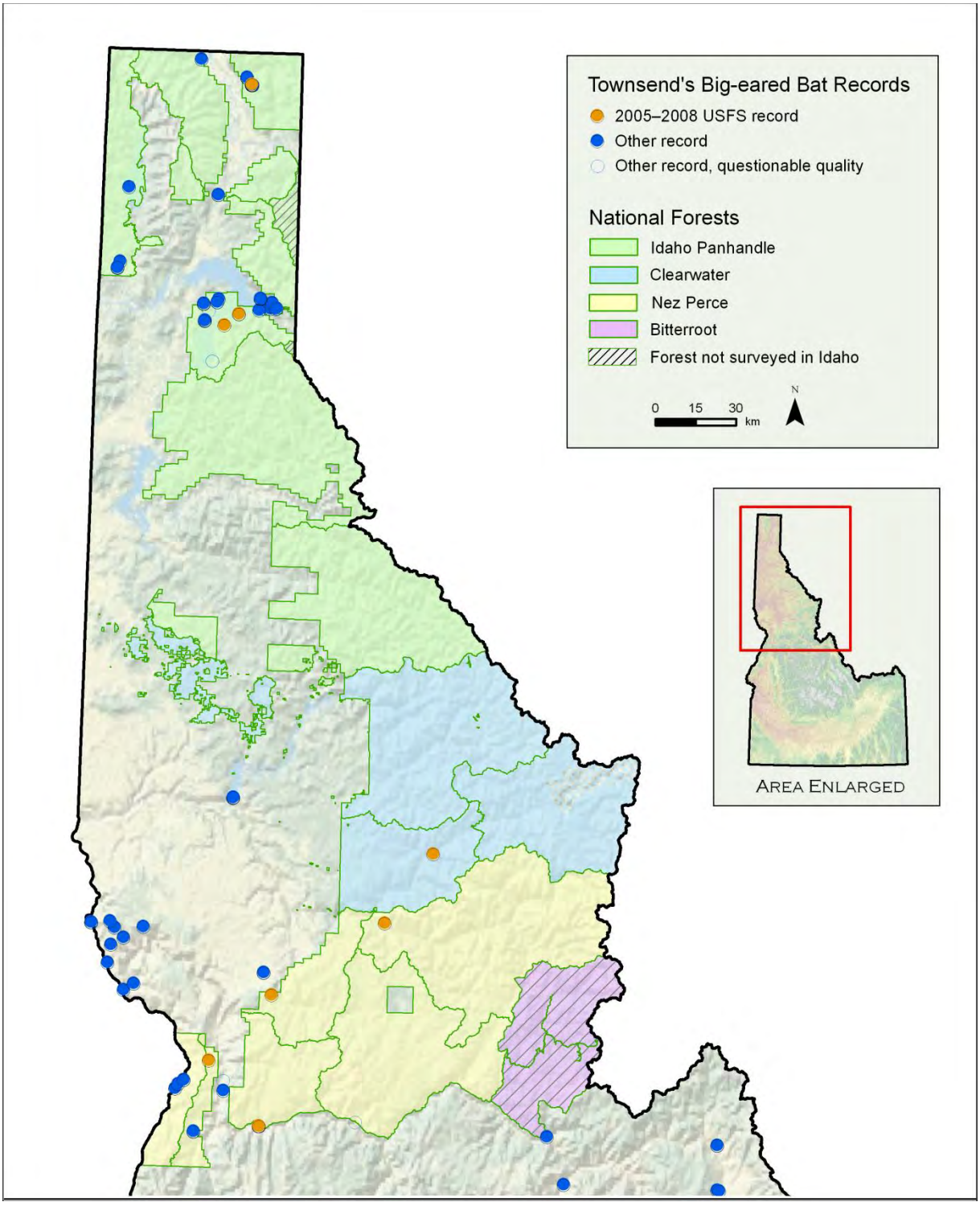

Figure 13. Distribution of Townsend‘s big-eared bat (*Corynorhinus townsendii*) records in northern Idaho. The Townsend‘s big-eared bat is designated as a Species of Greatest Conservation Need in Idaho‘s Comprehensive Wildlife Conservation Strategy, and is designated as a Northern Region sensitive species.

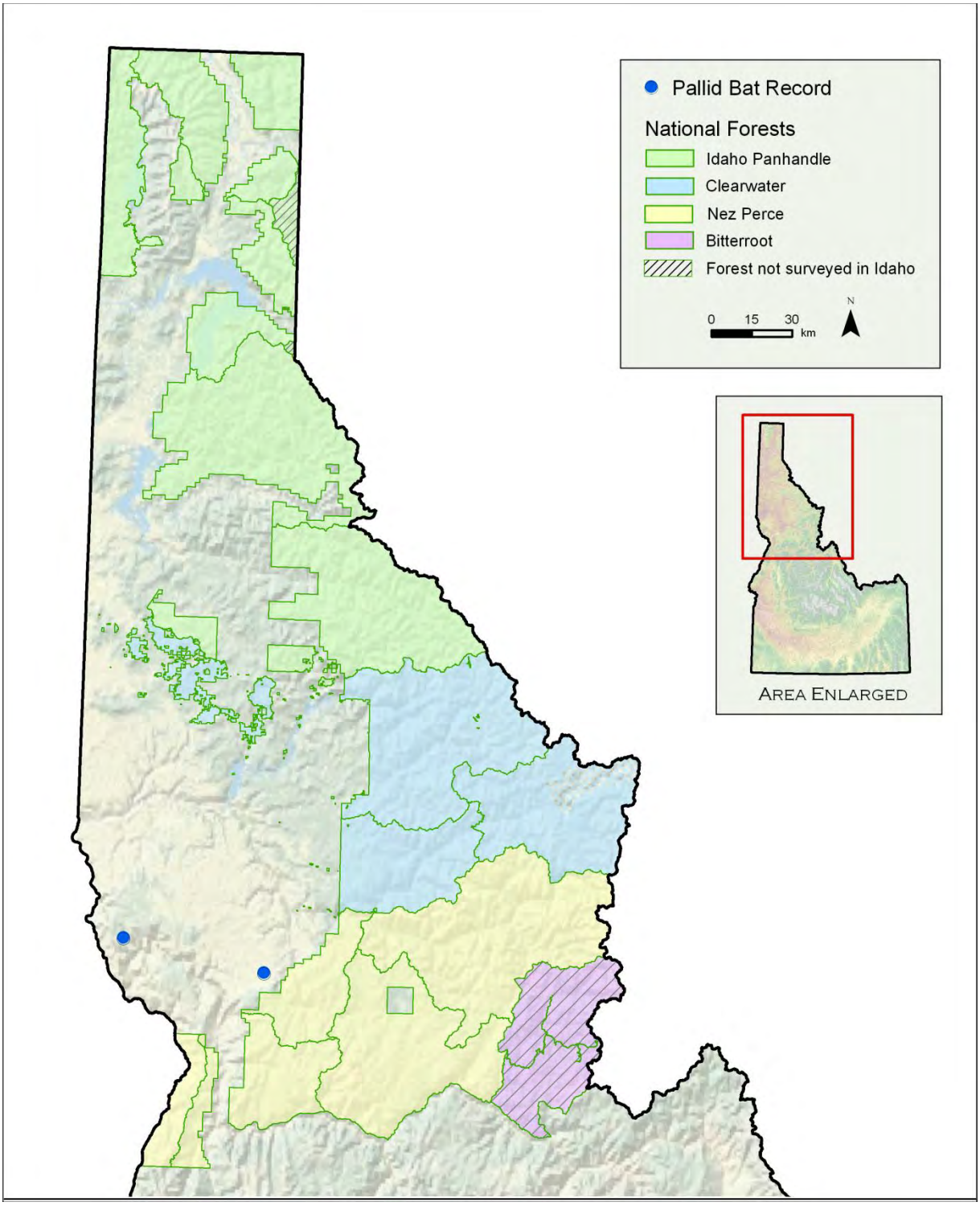

Figure 14. Distribution of pallid bat (*Antrozous pallidus*) records in northern Idaho. The pallid bat is designated as a Northern Region sensitive species

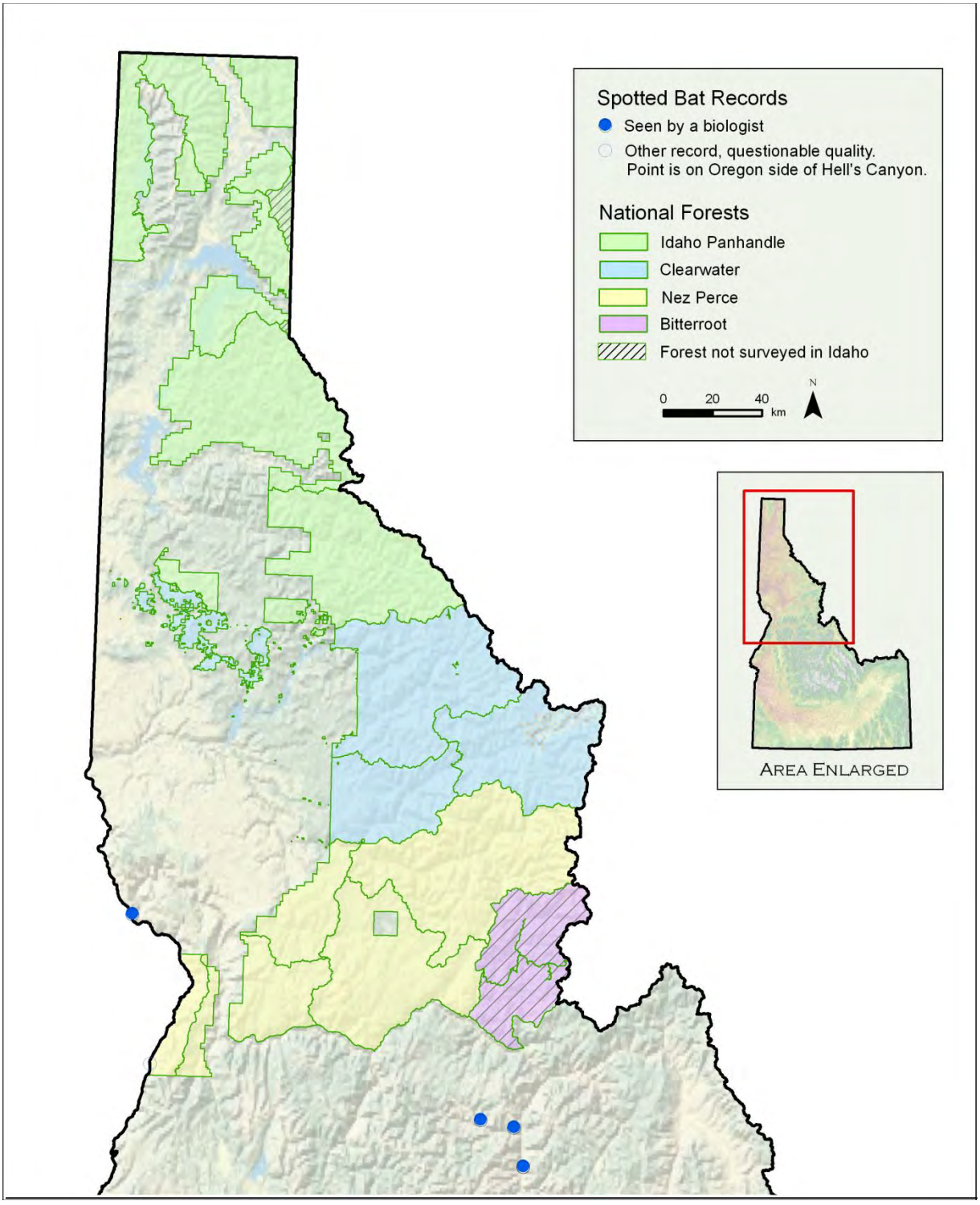

Figure 15. Distribution of spotted bat (*Euderma maculatum*) records in northern Idaho. The spotted bat is designated as a Species of Greatest Conservation Need in Idaho's Comprehensive Wildlife Conservation Strategy, and is designated as a Northern Region sensitive species.

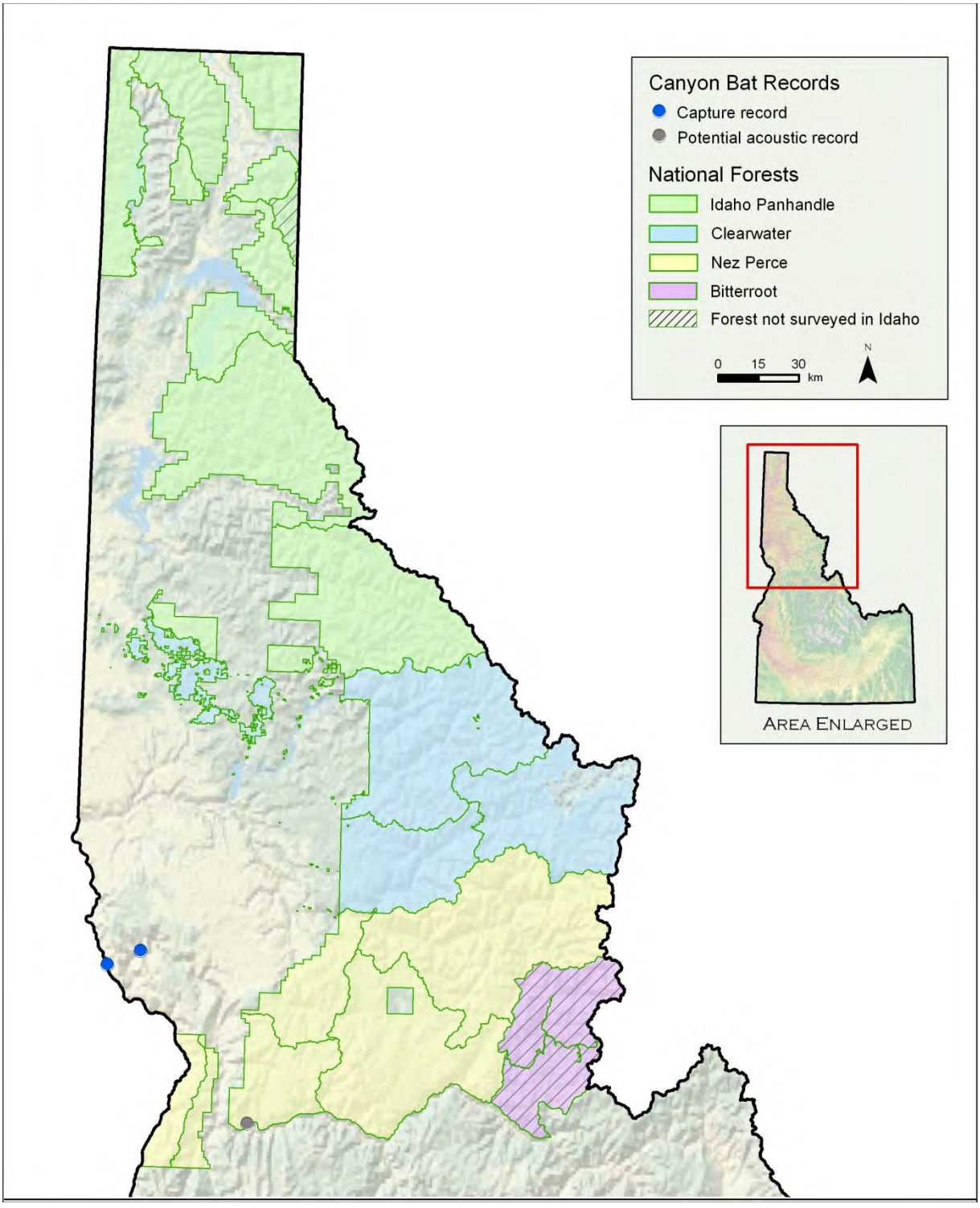

Figure 16. Distribution of canyon bat (*Parastrellus hesperus*) records in northern Idaho.

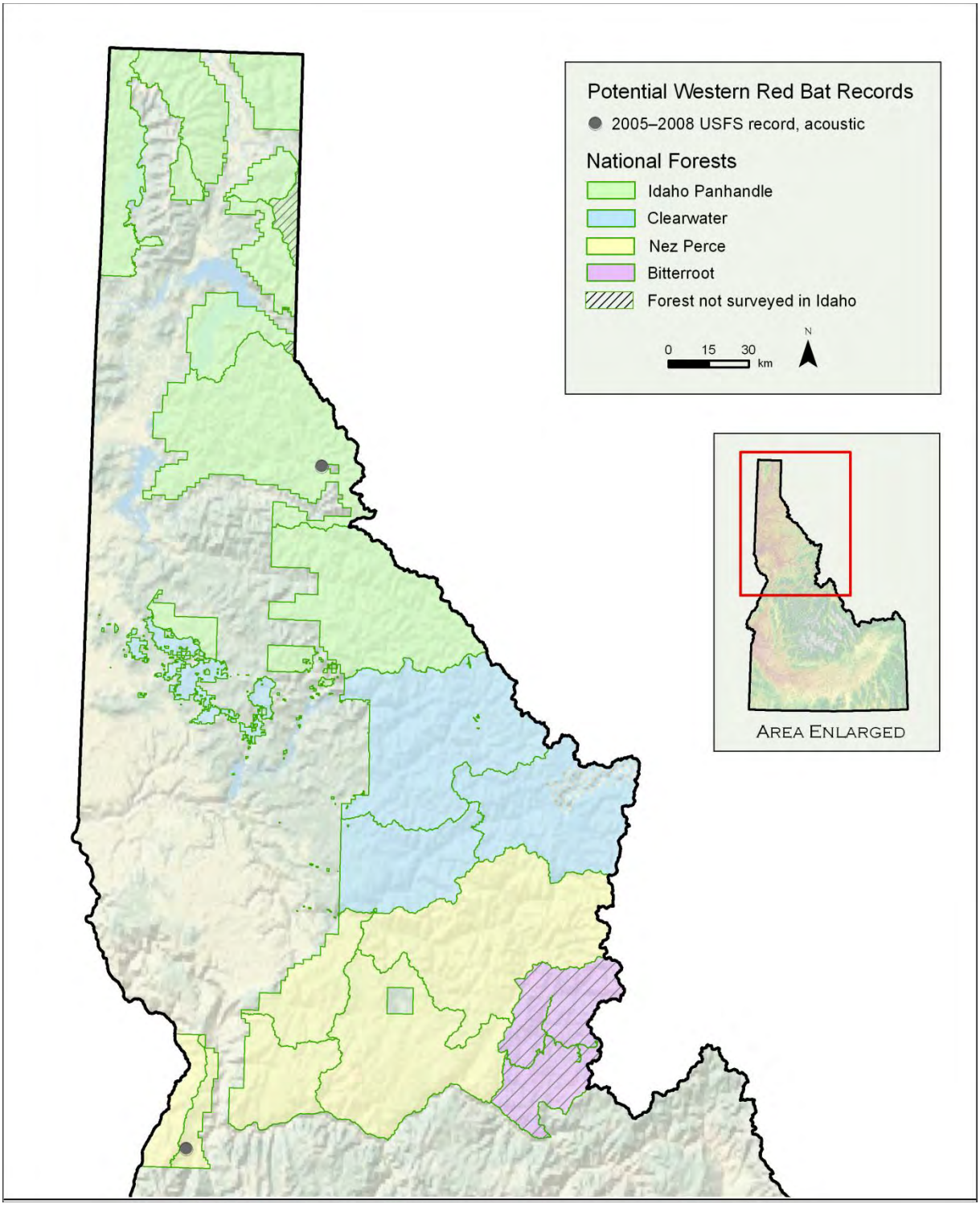

Figure 17. Potential records of the western red bat (*Lasiurus blossevillii*) in northern Idaho.

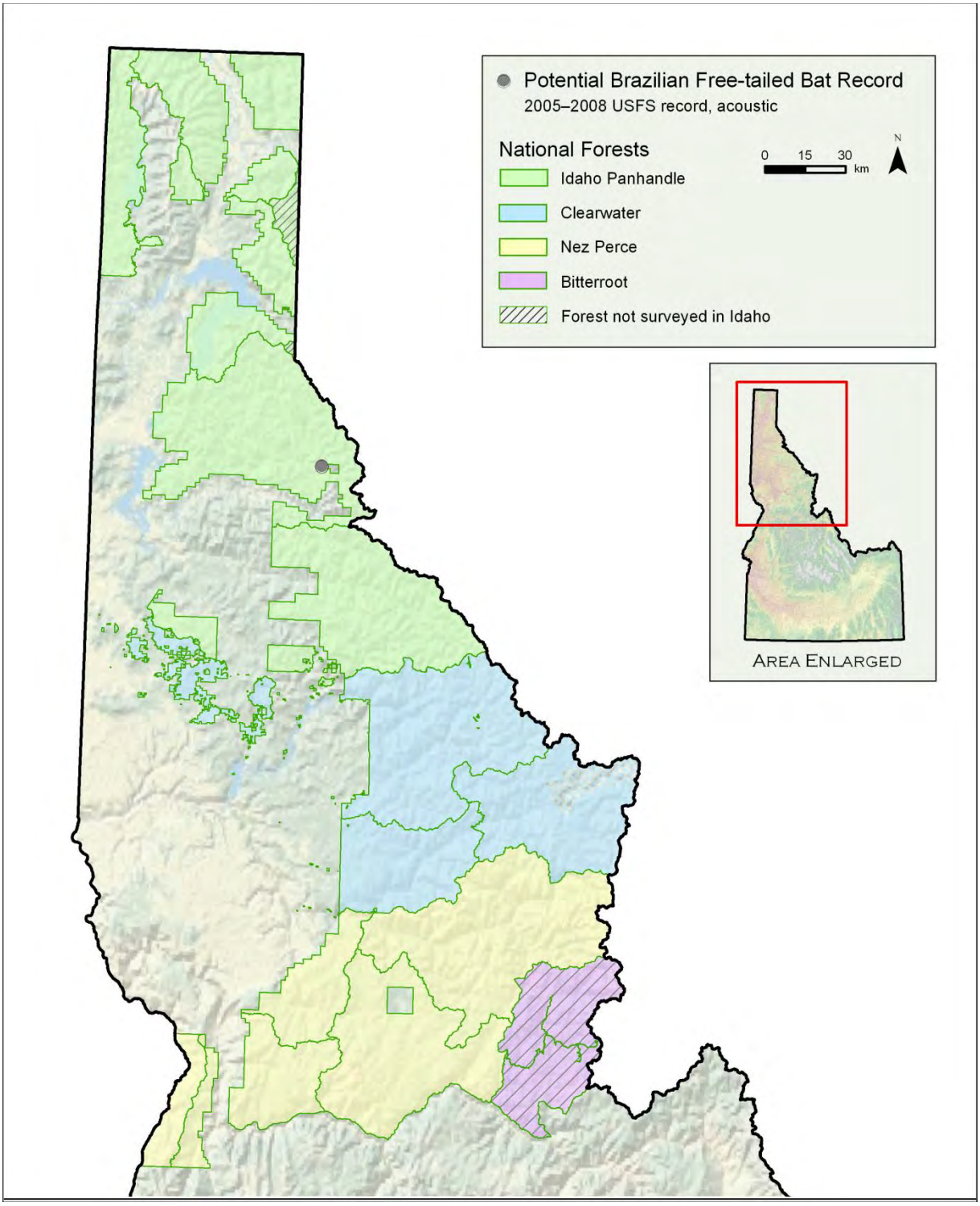

Figure 18. Potential record of the Brazilian free-tailed bat (*Tadarida brasiliensis*) in northern Idaho.

APPENDIX

Summary of morphometric data, age and sex ratio, and reproductive status of bats captured during 2005-2008 surveys on Northern Region National Forests in Idaho.

Introduction

Surveys for bats were conducted across the Northern Region National Forests in Montana, Idaho, and South Dakota during 2005-2008. The data summarized here represent only the Idaho subset of the 2005-2008 capture data, and are provided for the convenience of Ranger District biologists in Idaho. Leonard et al. (2009) pooled the same data types across all three states for 2005-2007.

Methods

Of the 2075 records in Idaho's 2005-2008 Northern Region dataset, 565 represented mist-net captures. 469 of these captures were identified to species and included at least one morphometric, age, sex, or reproductive-status data point. Weight was measured to the nearest 0.5 g using a Pesola spring scale. Forearm length and hind foot were measured to the nearest 0.1 mm using a dial caliper, and ear length was measured to the nearest 0.1 mm using a ruler. Age was recorded as adult or juvenile, as determined by the ossification of digit joints. Reproductive status was noted as nulliparous, parous, pregnant, lactating, or post-lactating for females; and as testicular or non-reproductive for males. Juveniles were not included in the morphometric analysis categories, and only non-pregnant adults were included in analysis of weight.

Following Lenard et al. (2009), we compared morphometric measurements from the Northern Region dataset with measurements published by Nagorsen and Brigham (1993), the largest, most comprehensive and readily available dataset for the northwest. Nagorsen and Brigham's measurements are based on adult museum specimens and live animals from British Columbia. We also compared the Northern Region measurements with rangewide means and ranges published in the mammalian species account for each species. However not all species accounts include all measurements. The citation for each account is listed in the corresponding table.

Results and Discussion

Mean weights of four species in the Northern Region dataset—the silver-haired bat, western small-footed myotis, long-eared myotis, and Townsend's big-eared bat—were higher than means published by Nagorsen and Brigham (1993) (Table A1). Weight of individual bats varies considerably throughout the evening and the time of

year. Most individuals in the Northern Region dataset were captured during June through August, between 10:00 pm and 1:30 am. A few bats were captured as early in the evening as 7:45 and as late in the season as early September. For the silver-haired bat and the long-eared myotis, the Northern Region means fell within ranges published by Kunz (1982) and Manning and Jones (1989).

With the exception of the western small-footed myotis, the mean forearm lengths of all species fell within means published by Nagorsen and Brigham (1993) and the authors of the mammalian species accounts (Table A2). The longer forearm measurement of the western small-footed myotis [36.9 ± 2.9 (Northern Region dataset) vs. 31.8 (Nagorsen and Brigham 1993) and <34 (Holloway and Barclay 2001)] may be an artifact of a small sample size (n=7). However, this effect was not seen in other species subsets with low sample sizes.

Mean ear measurements for eight bat species were shorter than the measurements published by Nagorsen and Brigham (1993), regardless of sample size in either dataset (Table A3). The only exception was the mean ear length of the silver-haired bat. Ear length can be challenging to accurately measure on live bats, and Nagorsen and Brigham's sample included museum specimens, which may have altered the mean. However, in five species, the shortest individual ear length was also shorter than the shortest length reported by Nagorsen and Brigham. Lenard et al. (2009) noted a similar pattern of ear length measurements with data pooled for 2005-2007 across Idaho, Montana, and South Dakota NFs. With the exception of the long-eared myotis, mean ear lengths of both the Northern Region and Nagorsen and Brigham datasets fall within the ear length range published in the mammalian species accounts.

Mean foot lengths for all four species with data were the same as measurements published by Fenton and Barclay (1980), Holloway and Barclay (2001), Nagorsen and Brigham (1993), Simpson (1993), and Warner and Czaplewski (1984) (Table A4).

With the exception of the western small-footed myotis and the fringed myotis, males of all species were captured more frequently than were females (Table A5). Many bat species segregate by sex during summer months, with females congregating in maternity colonies while males disperse throughout the landscape. The patchiness of female distribution may lead to females being captured less frequently than males. The sex ratios for the western small-footed myotis and juveniles of all species are based on very small sample sizes, but the higher ratio of adult fringed myotis females

in the dataset can be attributed to nets placed near maternity colonies; 21 of 25 captured females were pregnant or lactating.

Across the Northern Region NFs in Idaho, juveniles of six species were captured (Table A5), and adults were consistently captured more frequently than juveniles. This pattern would be expected as adults are available for capture throughout the survey season, from June through September, while juveniles are volant only during the later summer months. Across all four years of survey data, just four juveniles were captured early in the season; these were all captured on 10 July 2007. All other juveniles in the dataset were captured 18 July or later, with the majority captured in August.

Lactating or visibly pregnant females, which represent the best evidence in the dataset of maternity colonies, were found on eight RDs in three NFs (Table A6). Seven species were captured. The most widespread species was the long-eared myotis, which was captured on seven RDs. Pregnant or lactating fringed myotis, a special status species, were captured relatively often compared to other reproductive females, and occurred at five locations, on the Bonners Ferry and Sandpoint RDs (Idaho Panhandle NF) and the Salmon River RD (Nez Perce NF). Groups of eight, seven, and four individuals were captured at three locations. Fringed myotis were not specifically targeted by the surveys.

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Tables

Table A1. Weight (g) for each species captured across Northern Region National Forests in Idaho during 2005-2008. Mean ± standard deviation, range, and sample size (n) are shown in each cell, with published means and ranges shown for comparison.

	Northern Region Dataset			Published Data	
Species	Females	Males	Both sexes	Nagorsen and Brigham (1993)	Mammalian species accounts
Big brown bat *Eptesicus fuscus*	19.7 ± 2.0 17.5 – 22.5 (5)	18.1 ± 3.7 12.9 – 26.5 (13)	18.6 ± 3.4 12.9 – 26.5 (18)	15.2 8.8 – 21.9 (36)	11 – 23 Kurta and Baker (1990)
Silver-haired bat *Lasionycteris noctivagans*	12.1 ± 1.9 7.0 – 15.0 (25)	11.7 ± 1.4 8.8 – 17.6 (75)	11.8 ± 1.6 7.0 – 17.6 (100)	9.0 5.8 – 12.4 (14)	8.1 – 11 Kunz (1982)
Hoary bat *Lasiurus cinereus*	29.1 ± 3.0 27.0 – 31.2 (2)	26.5 ± 2.4 24.0 – 30.0 (5)	27.3 ± 2.6 24.0 – 31.2 (7)	28.4 20.1 – 37.9 (43)	20 – 35 Shump and Shump (1982)
California myotis *Myotis californicus*	5.3 ± 0.8 4.0 – 6.5 (11)	4.9 ± 0.9 4.0 – 7.0 (16)	5.1 ± 0.8 4.0 – 7.0 (27)	4.4 3.3 – 5.4 (26)	3.3 – 5.4 Simpson (1993)
W. small-footed myotis *Myotis ciliolabrum*	6.0 ± 1.2 4.9 – 7.6 (5)	7.1 (1)	6.3 ± 1.2 4.9 – 7.6 (6)	4.6 2.8 – 5.5 (23)	4.5 Holloway and Barclay (2001)
Long-eared myotis *Myotis evotis*	6.4 ± 0.8 5.0 – 7.9 (38)	6.2 ± 0.5 5.0 – 7.5 (49)	6.3 ± 0.7 5.0 – 7.9 (87)	5.5 4.2 – 8.6 (25)	5 – 8 Manning and Jones (1989)

Species	Northern Region Dataset			Published Data	
	Females	Males	Both sexes	Nagorsen and Brigham (1993)	Mammalian species accounts
Little brown myotis *Myotis lucifugus*	6.0 ± 0.1 5.9 – 6.1 (2)	6.1 ± 0.7 3.5 – 7.4 (27)	6.1 ± 0.7 3.5 – 7.4 (29)	6.2 6.2 – 10.2 (98)	—
Fringed myotis *Myotis thysanodes*	7.5 ± 0.7 5.6 – 9.0 (23)	6.7 ± 0.6 6.0 – 7.5 (8)	7.3 ± 0.7 5.6 – 9.0 (31)	7.1 5.4 – 8.4 (35)	—
Long-legged myotis *Myotis volans*	8.1 ± 0.7 6.7 – 9.5 (18)	7.3 ± 0.7 5.7 – 8.8 (21)	7.7 ± 0.8 5.7 – 9.5 (39)	7.2 5.5 – 10.0 (18)	—
Yuma myotis *Myotis yumanensis*	6.3 ± 1.7 5.2 – 9.5 (6)	5.7 ± 0.6 4.7 – 6.5 (18)	5.8 ± 1.0 4.7 – 9.5 (24)	6.6 4.0 – 8.5 (153)	—
Townsend's big-eared bat *Corynorhinus townsendii*	11.0 (1)	9.8 ± 1.2 8.9 – 10.6 (2)	10.2 ± 1.1 8.9 – 11.0 (3)	8.6 6.0 – 13.5 (15)	5 – 13 Kunz and Martin (1982)

Table A2. Forearm length (mm) $\bar{x}$ for each species captured across Northern Region National Forests in Idaho during 2005-2008. Mean ± standard deviation, range, and sample size (n) are shown in each cell, with published means and ranges shown for comparison.

	Northern Region Dataset			Published Data	
Species	Females	Males	Both sexes	Nagorsen and Brigham (1993)	Mammalian species accounts
Big brown bat *Eptesicus fuscus*	46.9 ± 1.1 45.0 – 48.0 (5)	45.6 ± 3.2 36.0 – 49.0 (13)	46.0 ± 2.8 36.0 – 49.0 (18)	47.5 43.0 – 52.0 (109)	39 – 54 Kurta and Baker (1990)
Silver-haired bat *Lasionycteris noctivagans*	42.2 ± 1.4 40.4 – 45.0 (26)	41.4 ± 1.2 38.6 – 46.0 (76)	41.6 ± 1.3 38.6 – 46.0 (76)	41.4 39.1 – 43.9 (56)	—
Hoary bat *Lasiurus cinereus*	47.8 ± 11.2 39.9 – 55.7 (2)	53.4 ± 6.4 38.0 – 57.5 (8)	52.3 ± 7.2 38.0 – 57.5 (10)	54.5 50.3 – 57.4 (24)	50.2 Shump and Shump (1982)
California myotis *Myotis californicus*	33.9 ± 1.5 32.5 – 38.5 (13)	33.1 ± 1.8 31.1 – 37.6 (16)	33.5 ± 1.7 31.1 – 38.5 (29)	32.1 29.4 – 35.0 (68)	33.3 32 – 35 Simpson (1993)
W. small-footed myotis *Myotis ciliolabrum*	36.7 ± 2.8 33.1 – 39.8 (6)	38.3 (1)	36.9 ± 2.6 33.1 – 39.8 (6)	31.8 28.8 – 33.4 (47)	<34 Holloway and Barclay (2001)
Long-eared myotis *Myotis evotis*	38.1 ± 1.3 35.2 – 40.9 (42)	38.0 ± 1.8 35.3 – 48.0 (52)	38.0 ± 1.6 35.2 – 48.0 (94)	38.4 36.0 – 42.0 (47)	36 – 41 Manning and Jones (1989)
Little brown myotis *Myotis lucifugus*	36.4 ± 0.0 36.4 – 36.4 (2)	36.0 ± 0.6 34.9 – 37.5 (28)	36.0 ± 0.6 34.9 – 37.5 (28)	36.4 33.0 – 40.3 (295)	33 – 41 Fenton and Barclay (1980)

Species	Northern Region Dataset			Published Data	
	Females	Males	Both sexes	Nagorsen and Brigham (1993)	Mammalian species accounts
Fringed myotis *Myotis thysanodes*	41.7 ± 1.7 37.8 – 45.0 (26)	40.9 ± 2.4 37.0 – 44.5 (9)	41.5 ± 1.9 37.0 – 45.0 (35)	42.2 40.0 – 44.5 (36)	40 – 47 O'Farrell, and Studier (1980)
Long-legged myotis *Myotis volans*	39.5 ± 0.9 37.4 – 41.0 (21)	38.6 ± 0.9 37.1 – 41.0 (21)	39.0 ± 1.0 37.1 – 41.0 (42)	38.3 34.0 – 43.0 (46)	37.0 – 41.2 Warner and Czaplewski (1984)
Yuma myotis *Myotis yumanensis*	35.1 ± 1.2 33.9 – 37.5 (7)	34.1 ± 0.7 33.1 – 35.9 (19)	34.4 ± 0.9 33.1 – 37.5 (26)	34.3 30.0 – 38.0 (273)	—
Townsend's big-eared bat *Corynorhinus townsendii*	45.0 (1)	42.5 ± 0.8 41.9 – 43.1 (2)	43.3 ± 1.5 41.9 – 45.0 (3)	42.6 39.0 – 45.2 (55)	39.2 – 47.6 Kunz and Martin (1982)

Table A3. Ear length (mm) for each species captured across Northern Region National Forests in Idaho during 2005-2008. Mean ± standard deviation, range, and sample size (n) are shown in each cell, with published means and ranges shown for comparison.

	Northern Region Dataset			Published Data	
Species	Females	Males	Both sexes	Nagorsen and Brigham (1993)	Mammalian species accounts
Big brown bat *Eptesicus fuscus*	11.3 ± 1.2 10.0 – 12.0 (3)	11.4 ± 0.9 10.0 – 12.0 (5)	11.4 ± 0.9 10.0 – 12.0 (8)	15 11 – 21 (40)	10 – 20 Kurta and Baker (1990)
Silver-haired bat *Lasionycteris noctivagans*	12.4± 0.9 11.0 – 13.0 (5)	11.0± 0.8 10.0 – 13.0 (14)	11.4± 1.0 10.0 – 13.0 (19)	12 9 – 15 (17)	—
California myotis *Myotis californicus*	11.5 ± 0.9 11.0 – 12.5 (3)	9.9 ± 1.1 9.0 – 11.5 (6)	10.4 ± 1.1 9.0 – 12.5 (9)	13 8 – 15 (40)	12.9 11 – 15 Simpson (1993)
W. small-footed myotis *Myotis ciliolabrum*	12.0 ± 0 12.0 – 12.0 (2)	—	12.0 ± 0 12.0 – 12.0 (2)	13 8 – 15 (25)	11 – 16 Holloway and Barclay (2001)
Long-eared myotis *Myotis evotis*	16.8 ± 0.9 15.0 – 19.0 (39)	16.8 ± 0.8 15.0 – 19.0 (51)	16.8 ± 0.8 15.0 – 19.0 (90)	20 17 – 22 (31)	19 – 22 Manning and Jones (1989)
Little brown myotis *Myotis lucifugus*	11.0 (1)	10.6 ± 1.3 7.0 – 12.0 (13)	10.7 ± 1.3 7.0 – 12.0 (14)	13 9 – 17 (217)	11.0 – 15.5 Fenton and Barclay (1980)
Fringed myotis *Myotis thysanodes*	15.7 ± 1.0 13.0 – 18.0 (23)	14.8 ± 1.2 13.0 – 17.0 (9)	15.5 ± 1.1 13.0 – 18.0 (32)	18 16 – 20 (10)	16 – 20 O'Farrell, and Studier (1980)

Species	Northern Region Dataset			Published Data	
	Females	Males	Both sexes	Nagorsen and Brigham (1993)	Mammalian species accounts
Long-legged myotis *Myotis volans*	9.5 ± 1.2 8.0 – 11.0 (7)	10.1 ± 1.4 8.0 – 12.0 (8)	9.8 ± 1.3 8.0 – 12.0 (15)	12 9 – 15 (22)	10 – 15 Warner and Czaplewski (1984)
Yuma myotis *Myotis yumanensis*	10.0 ± 1.4 9.0 – 11.0 (2)	9.9 ± 0.9 9.0 – 11.0 (4)	9.9 ± 0.9 9.0 – 11.0 (6)	14 8 – 16 (202)	—

Table A4. Foot length of myotis species for which data was collected for each species captured across Northern Region National Forests in Idaho during 2005-2008. Mean ± standard deviation, range, and sample size (n) are shown in each cell, with published means and ranges shown for comparison.

	Northern Region Dataset			Published Data	
Species	Females	Males	Both sexes	Nagorsen and Brigham (1993)	Mammalian species accounts
California myotis *Myotis californicus*	6.5 ± 1.3 5.0 – 9.0 (10)	6.2 ± 0.8 5.0 – 7.0 (9)	6.4 ± 1.1 5.0 – 9.0 (19)	6 5 – 9 (80)	6.3 5 – 8 Simpson (1993)
W. small-footed myotis *Myotis ciliolabrum*	9.0 ± 1.3 6.0 – 9.0 (4)	7.0 (1)	7.2 ± 1.2 6.0 – 9.0 (5)	7 6 – 8 (44)	<9 Holloway and Barclay (2001)
Little brown myotis *Myotis lucifugus*	—	9.2 ± 1.1 7.0 – 10.0 (9)	9.2 ± 1.1 7.0 – 10.0 (9)	10 6 – 13 (385)	8 – 10 Fenton and Barclay (1980)
Long-legged myotis *Myotis volans*	8.3 ± 1.0 6.0 – 10.0 (15)	8.7 ± 1.0 7.0 – 10.0 (11)	8.5 ± 1.0 6.0 – 10.0 (26)	9 7 – 10 (31)	5 – 9 Warner and Czaplewski (1984)

Table A5. Age and sex ratios of adult (A) and juvenile (J), female (F) and male (M) bats captured across Northern Region Forests in Idaho during 2005-2008.

		F:M	
Species	A:J	A	J
Big brown bat	18:4	5:13	1:3
Silver-haired bat	114:34	38:76	8:16
Hoary bat	10:0	2:8	—
California myotis	29:4	13:16	1:3
Western small-footed myotis	7:0	6:1	—
Long-eared myotis	98:10	44:54	4:6
Little brown myotis	31:0	2:29	—
Fringed myotis	36:3	27:9	0:3
Long-legged myotis	44:7	22:22	3:4
Yuma myotis	26:0	7:19	—
Townsend's big-eared bat	3:0	1:2	—

Table A6. Indirect evidence of maternity colonies on Ranger Districts (RD), indicated by capture of pregnant (P) or lactating (L) female bats in mist-nets during 2005-2008 field seasons. National Forests are Clearwater National Forest (CNF), Idaho Panhandle National Forest (IPNF), and Nez-Perce National Forest (NPNF).

		CFN	IPNF				NPNF		
Species		Palouse RD	Bonners Ferry RD	Coeur d'Alene River RD	Sandpoint RD	Clearwater RD	Moose Creek RD	Red River RD	Salmon River RD
Big brown bat	*Eptesicus fuscus*								L
Silver-haired bat	*Lasionycteris noctivagans*			L	L	L			L
California myotis	*Myotis californicus*		L	L	L	L		L	
Western small-footed myotis	*Myotis ciliolabrum*				P	L			
Long-eared myotis	*Myotis evotis*	L	PL	L	PL	P	L		L
Fringed myotis	*Myotis thysanodes*		PL		PL				L
Long-legged myotis	*Myotis volans*		PL	L	PL				L